PB83-234153

Supplemental Final Environmental Impact Statement Dolet Hills Lignite Mine Project De Soto Parish Louisiana (A Supplement to the Dolet Hills Power Plant EIS)

(U.S.) Environmental Protection Agency
Dallas, TX. Region VI

Jul 83

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The Supplemental Final Environmental Impact Statement (SFEIS) was prepared as part of the "tiering" concept, and is intended to supplement the Dolet Hills Power Plant Project Draft EIS and Final EIS in which Southwestern Electric Power Company (SWEPCO) and Central Louisiana Electric Company, Inc. (CLECO) evaluated alternative power plant designs and mine-mouth siting options around a 211.1 million ton lignite reserve. The Dolet Hills Mining Venture (DHMV) proposes to construct and operate a 29,573 acre surface lignite mine and related ancillary facilities consisting of a main office, field workshops, dragline erection areas, a conveyor system, haul roads, sedimentation ponds, and stream and runoff diversion structures. DHMV also proposes to extract 141.1 million tons of lignite for 32 years (at a peak production rate of 5.64 million tons per year). EPA is considering the issuance or denial of a New Source NPDES permit for the alternatives evaluated, including no action. The SFEIS documents coordination activities since the supplemental draft EIS, includes revisions in response to comments, and presents EPA's and DHMV's preferred alternatives.

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Region 6
1201 Elm Street
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July 1983

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Environmental Impact Statement

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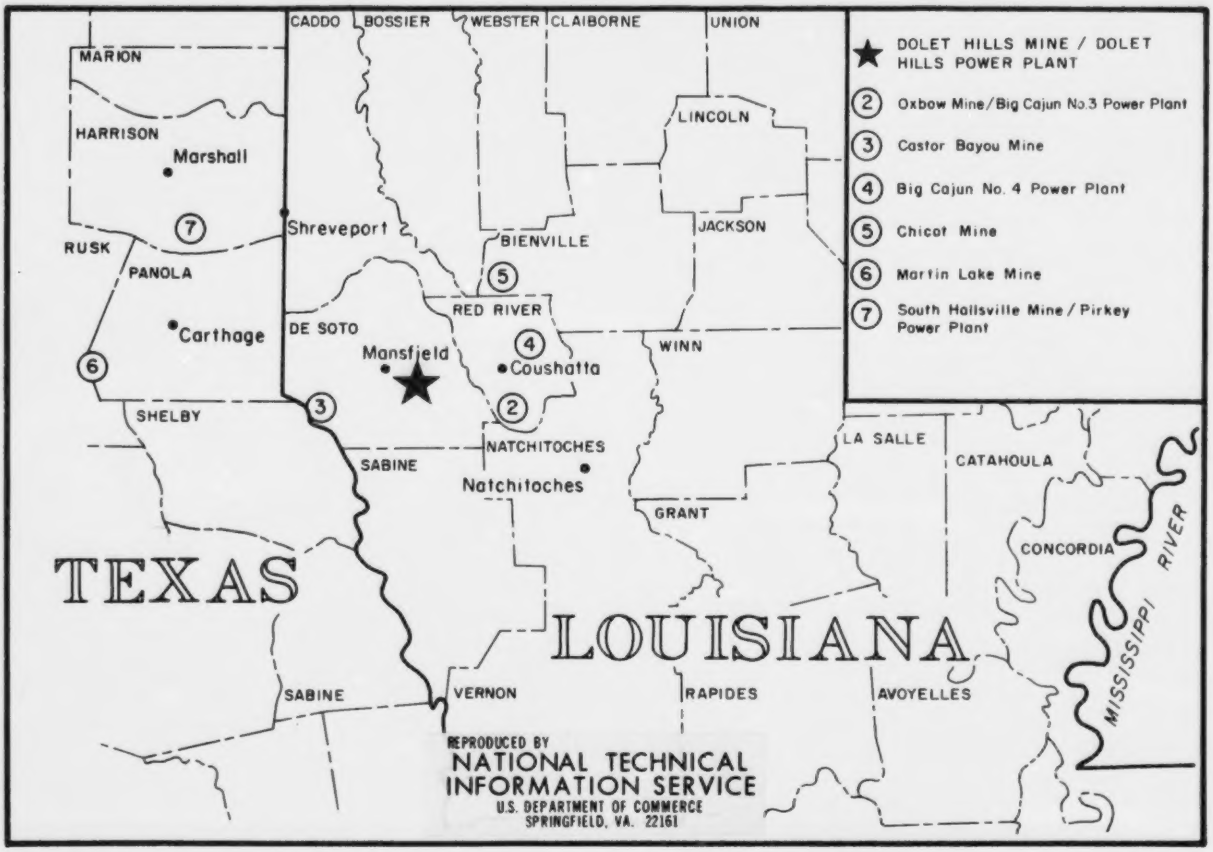
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★ DOLET HILLS MINE / DOLET HILLS POWER PLANT
② Oxbow Mine/Big Cajun No.3 Power Plant
③ Castor Bayou Mine
④ Big Cajun No. 4 Power Plant
⑤ Chicot Mine
⑥ Martin Lake Mine
⑦ South Hallsville Mine/Pirkey Power Plant

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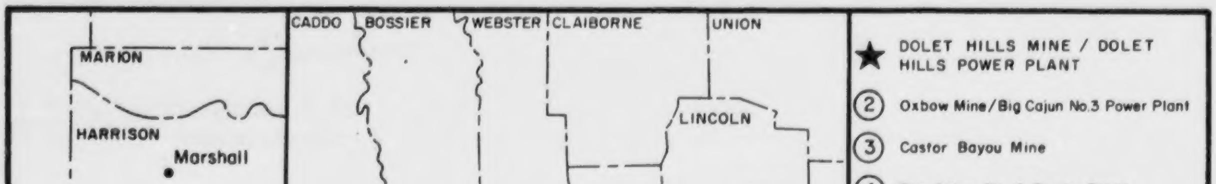
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⑦ South Hallsville Mine / Pirkey Power Plant

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

June 30, 1983

TO ALL INTERESTED AGENCIES, PUBLIC GROUPS AND OFFICIALS:

Enclosed for your review and comment is the Supplemental Final Environmental Impact Statement (SFEIS) on EPA's New Source National Pollutant Discharge Elimination System (NPDES) permit action for the Dolet Hills Lignite Mine.

Comments on this SFEIS should be sent to Mr. Clinton B. Spotts, Regional EIS Coordinator, EPA, Region 6, 1201 Elm Street, Dallas, Texas 75270. It is requested that comments be submitted by the date stamped on the cover sheet following this letter. A "Record of Decision", documenting the completion of the environmental review and EPA's decision on the NPDES permit, will be sent to agencies and interested parties making substantive comments on the SFEIS and those who request a copy.

Sincerely yours,

Myron O. Knudson

for Dick Whittington, P.E.
Regional Administrator

SUPPLEMENTAL FINAL ENVIRONMENTAL IMPACT STATEMENT
DOLET HILLS LIGNITE MINE PROJECT
DE SOTO PARISH LOUISIANA
(A SUPPLEMENT TO THE DOLET HILLS POWER PLANT EIS)

Responsible Agency:	U.S. Environmental Protection Agency, Region 6
Action being considered:	Issuance of a new source National Pollutant Discharge Elimination System (NPDES) permit to the Dolet Hills Mining Venture (DHMV), for construction and operation of a surface lignite mine in De Soto Parish, Louisiana.
Cooperating Agencies:	U.S. Army Corps of Engineers New Orleans District Fort Worth District U.S. Department of the Interior Office of Surface Mining Fish and Wildlife Service National Park Service U.S. Department of Agriculture Soil Conservation Service Federal Emergency Management Agency State of Louisiana Office of Conservation Office of Public Works Office of Program Development Office of State Parks Office of Agricultural and Environmental Sciences Office of Commerce and Industry
Contact for further information:	Clinton B. Spotts, Regional EIS Coordinator U.S. Environmental Protection Agency, Region 6 (ES-F) 1201 Elm Street, Suite 2800 Dallas, Texas 75270 Phone: Commercial (214) 767-2716 FTS 729-2716

Abstract:

This Supplemental Final Environmental Impact Statement (SFEIS) has been prepared as part of the "tiering" concept, and is intended to supplement the Dolet Hills Power Plant Project Draft EIS and Final EIS in which Southwestern Electric Power Company (SWEPCO) and Central Louisiana Electric Company, Inc. (CLECO) evaluated alternative power plant designs and mine-mouth siting options around a 211.1 million ton lignite reserve. DHMV proposes to construct and operate a 11,968-hectare (29,573-acre) surface lignite mine and related ancillary facilities consisting of a main office, field workshops, dragline erection areas, a conveyor system, haul roads, sedimentation ponds, and stream and runoff diversion structures. DHMV also proposes to extract 141.1 million tons of lignite (at a peak production rate of 5.64 million tons per year) for 32 years. EPA is considering the issuance or denial of a New Source NPDES permit for the alternatives evaluated, including no action. This SFEIS documents coordination activities since the draft supplement was issued, includes revisions to the supplement in response to comments, and presents EPA's and DHMV's preferred alternatives.

Date Comments due:

Responsible Official:

Myron O. Knudson

Dick Whittington, P.E.
Regional Administrator

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PART I

SUMMARY OF SUPPLEMENTAL DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENTS

PART I SUMMARY OF SUPPLEMENTAL DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENTS

A. BACKGROUND

The National Environmental Policy Act of 1969 (NEPA) requires that all Federal agencies prepare environmental impact statements on major actions significantly affecting the quality of the human environment. Furthermore, Section 511(c)(1) of the Federal Water Pollution Act (FWPCA or P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-217) mandates that the requirements of NEPA apply to issuing a permit under Section 402 of FWPCA for discharging any pollutant by a "New Source" as defined in Section 306 of FWPCA. The Environmental Protection Agency (EPA) determined that the issuance of a New Source NPDES permit to the Dolet Hills Mining Venture for the first 5-year period of the proposed Dolet Hills Lignite Mine Project, a surface lignite mine operation which will fuel the Dolet Hills Power Plant, represented a major Federal action significantly affecting the quality of the human environment. An environmental impact statement (EIS) was prepared to assess the impacts of the proposed lignite mine, and EPA's New Source NPDES permit action, as a supplement to the Dolet Hills Power Plant Project EIS. This supplemental final EIS (SFEIS) includes a summary of the supplemental draft EIS (SDEIS) and SFEIS, revisions to the SDEIS in response to comments, coordination activities since distribution of the SDEIS, and EPA's and DHMV's preferred alternatives.

B. ALTERNATIVES

Taking no action was evaluated, in addition to numerous mine and transportive systems designs. Energy sources for the Dolet Hills Power Plant such as geothermal, solar, wind, coal, and petroleum gasification, natural gas, and western coal were evaluated and eliminated as being technologically infeasible at present, or not cost-effective. Lignite extraction alternatives that were considered included underground mining, auger mining, and surface mining. All operating lignite mines in the United States are surface mined, and this method was selected as the preferred alternative for the proposed mine. Other mine operation alternatives for the major components of a surface mine were considered, including overburden removal and handling techniques, lignite loading, lignite transportation, reclamation, and revegetation. Alternatives available to the EPA are to issue the NPDES permit for the project, to issue the NPDES permit for the project with certain conditions to minimize or alleviate adverse impacts, or to deny the permit.

DHMV's preferred alternative is to construct and operate the lignite mine as proposed and evaluated in the SDEIS and SFEIS. EPA's preferred alternative is to issue the NPDES permit as drafted and included as Appendix A of this SFEIS (for more details, see Part IV).

C. PROPOSED PROJECT

The proposed Dolet Hills Lignite Mine Project will be located approximately 10 kilometers (6.2 miles) southeast of Mansfield, Louisiana. The area to be mined contains an estimated 141.1 million recoverable tons of lignite. The mine should produce 4.4 million tons of lignite (average) per year, with maximum production reaching 5.64 million tons per year. The mine will be operated for SWEPCO/CLECO by DHMV. The proposed mine permit area encompasses 11,968 hectares (29,573 acres). Of this total, 6,259 hectares (15,466 acres) will be directly affected by mining during the 32-year life of the mine (1985-2017). Road construction will affect 70.8 hectares (175 acres), 57.5 hectares (142 acres) will be affected by the lignite conveyor system, 72.8 hectares (180 acres) will be affected by mine facilities, 27.6 hectares (68 acres) will be affected by permanent sedimentation ponds, 11.3 hectares (27.8 acres) will be affected by stream diversions outside the mining blocks, and dragline erection will disturb 4.5 hectares (11 acres). An average of 195 hectares (483 acres) will be mined on an annual basis for the life of the mine. The average number of hectares per year that will be disturbed by clearing, mining, and reclamation will be 280.5 hectares (693 acres). The maximum number of hectares that will be ungraded (disturbed or exposed) per year (2001-2008) will be approximately 486 hectares (1,200 acres).

The proposed mine will use conventional single-seam mining procedures. In certain small areas, a second upper lignite seam may be mined where feasible and economical. Timber and other vegetation will be removed prior to mining. Where the lignite is equal to or less than 21 meters (70 feet) below the surface, draglines will be used to remove the overburden. At depths greater than 21 meters (70 feet), bucket-wheel excavators and/or scrapers will be used to prestrip the overburden down to a 21-meter (70-foot) bench above the lignite. A dragline will then operate off the bench to excavate the remaining overburden.

Once the lignite is exposed, hydraulic backhoes or continuous miners will excavate the lignite. It will then be loaded onto 70-ton dump trucks. The trucks will transport the lignite to a loading hopper where it will be transported to the Dolet Hills Power Plant via a conveyor system.

Road construction in the permit area will consist of building lignite haul roads from the mining pits to the conveyor system loading hopper, access roads, and temporary access roads. When the roads are no longer needed, the surface will be regraded and reclaimed to an approved postmining land use.

Mine facilities will consist of a main office block, field workshop facilities, and dragline erection sites. The main office block will house management, engineering, and administrative personnel. It will consist of an office building, automobile parking, and sewage treatment facilities. The two field workshop facilities will consist of a workshop, store yard, wash pad, mine vehicle parking area, fuel storage, and sewage treatment facilities. Sewage treatment units will be installed at the main and field offices, and will be three-cell biological oxidation lagoons with secondary treatment. Before entering a sedimentation pond, the wastewater will meet the NPDES permit requirements for total suspended solids (daily average, 30 mg/l; daily maximum, 45 mg/l) and 5-day biochemical oxygen demand (BOD) (daily average, 30 mg/l; daily maximum, 45 mg/l) (see page 4 of Appendix A). Water from vehicle washing will be treated in an oil separator before discharge to a sedimentation pond.

Throughout the life of the mine, temporary and permanent sedimentation ponds will be constructed to receive and detain runoff from disturbed areas. In addition, a series of temporary and permanent ditches and diversion structures will be installed to control surface water runoff. The ditches will consist of two types: upstream interceptor ditches and sediment diversion ditches. Upstream interceptor ditches will be used to direct drainage from undisturbed areas away from disturbed areas to prevent co-mingling of drainage. Sediment diversion ditches will direct runoff from disturbed areas to sediment control structures.

Levees will be necessary to prevent flooding caused by backwater when mining near Buffalo, Mundy, and San Patricio bayous in the west area, and near West Branch Dolet, Dolet, Prairie, and Louies bayous in the east area, and several smaller streams in the proposed project area. Overland flood control measures will be implemented to prevent runoff from entering active mine pits. Runoff toward the mine pit will be diverted around the pit, or in cases where diversion channel excavations would be too great, catchment basins will be formed by temporary dikes to keep water out of the pit. The overland flow diversions will be necessary to direct runoff from disturbed areas to sedimentation ponds.

Overburden handling will be as follows: where suitable sandy material occurs above the lignite, it will be selectively placed on the surface wherever possible. Where this is not possible, near-surface oxidized overburden will be placed on the surface. Both have been judged to be satisfactory medium for pine seedling growth (Harbert, 1982).

At the present time, the amount of leased land in the permit area is approximately 10,003 hectares (24,699 acres), of which 5,586 hectares (13,792 net acres) will be mined and then reclaimed. According to lease agreements, 50 percent of the leased land to be mined will be planted in pine only, 13 percent will be planted in pasture only, and 37 percent will be planted in grass or pine seedlings only following mining.

The total fee land to be mined that is owned exclusively by SWEPCO/CLECO without obligation is approximately 203 hectares (500 acres). This land is distributed in 4.0-32.4 hectare (10-80 acre) tracts in the eastern and western portions of the area to be mined and will be reclaimed primarily to wildlife habitat.

D. ENVIRONMENTAL EFFECTS OF NO ACTION

If the proposed mine is not constructed, environmental conditions would remain approximately as they presently exist. However, economic development is presently occurring in the project region and is expected to continue.

E. ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT

Environmental consequences of the proposed project and overburden handling alternatives for the project are presented in tabular form (Table I-1). A brief summary of effects follows.

1. Topography

Construction activities, involving the surface or near-surface disturbance by grading of approximately 253 hectares (625 acres) of land for mine facilities, dragline erection pads, haul and access roads, stream diversions (outside mining blocks), and the lignite conveyor system for life-of-mine will result in direct short-term adverse impacts on topography.

Direct short-term adverse impacts to the topography of the area will also result from mining. A 5- to 10-percent net volume increase is expected to occur in the replaced overburden after removal of the lignite. Reclamation activities will include reshaping the mined surface to a configuration similar to premining topography; this activity will take place immediately after each separate mining operation. Therefore, adverse impacts resulting from mining operations will be minor after reclamation.

2. Geological Resources

Construction activities associated with the mine ancillary area will result in localized long-term displacement of shallow surface sediments; no adverse impacts to geologic resources will occur.

The geologic units of the mine area that overlie the recoverable lignite will experience unavoidable long-term alterations. Disturbance of oil and gas wells in the mined area will be short-term as production can resume once mining activities are completed. Further,

TABLE 1-1

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED DOLET HILLS
LIGNITE MINE PROJECT

Factor	Project Alternatives	No Action Alternative/ Future Without the Project
Topography and Geology Resources	Direct short-term adverse impacts from grading of approximately 625 acres for ancillary use. Direct short-term adverse impacts to topography from mining. Localized long-term adverse impacts to shallow surface sediments. Short-term disturbance of oil and gas wells. Irretrievable committment of gravel resources within permit area.	No adverse impacts to topography or geologic structure; loss of recovery of lignite resources.
Soils	(1) DHMV's Preferred Alternative - Selective Handling of Overburden	
	Short-term adverse impacts from accelerated erosion lessened by seeding, mulching, revegetation. Presently SCS-designated prime farmland (approximately 3,013 hectares; 7,444 acres) will be irretrievably lost within the mined area and ancillary construction area, and may be adversely affected in the remaining ancillary area. Short-term reversible impacts in surface layers due to low organic matter and microbial content. Potential long-term adverse impact on productivity ratings, if future use is crop or pastureland. No effect on forest use, which constitutes principal postmining land use.	Continued erosion from timber removal and agriculture.
	(2) Topsoil Segregation over Random Overburden Mix Alternative	
	Accelerated erosion, loss of prime farmland.	
	(3) Random Overburden Mix Alternative	
	Short-term reversible adverse impacts from surface crusting and low microbial and organic matter content. Short-term reversible adverse impacts from localized acidic hot spots correctible by liming, reburying, topsoiling. Loss of prime farmland.	

TABLE I-1 (Continued)

Factor	Project Alternatives	No Action Alternative/ Future Without the Project
Ground Water	(1) Preferred Alternative - Selective Handling of Overburden Adverse impacts to transmissivity of aquifer, however, average yield once overburden is recharged should be similar to premining conditions. Adverse impact from destruction of approximately 48 wells, however, the wells can be redrilled after mining. Wells not destroyed will be subject to short-term effects of drawdown from dewatering/depressurization. Long-term adverse impact to groundwater quality from chloride and sulfate limited to mined area and near vicinity. (2) Topsoil Segregation over Randon Overburden Mix Alternative Same as (1) above. (3) Randon Overburden Mix Alternative Same as (1) above.	Potential future lignite mining in the project region could adversely impact ground water resources.
Surface Water	(1) Preferred Alternative - Selective Handling of Overburden Short-term impacts on surface water hydrologic regime i.e., temporary reductions of stream flow in decreased runoff, increased overland flow, increased sediment load. Short-term adverse water quality impacts. Approximately 15.9 kilometers (9.9 miles) of streams will be temporarily diverted and approximately 10.8 kilometers (6.7 miles) will be permanently diverted. Tenmile Bayou will be diverted from the Sabine River Basin to the Red River Basin for approximately two years. (2) Topsoil Segregation over Random Overburden Mix Alternative Same as (1); sediment load will differ. (3) Total Overburden Mix Alternative Same as (1) plus potential short-term reversible impacts from localized acidic hotspots that can be mitigated.	No adverse impacts.
Air Quality	Short-term adverse impacts through emission of particulate matter which are expected to be periodic, local in nature, and minor due to dispersion characteristics in the region.	Potential adverse impacts from future industrial development.

TABLE 1-1 (Continued)

Factor	Project Alternatives	No Action Alternative/ Future Without the Project
Sound	Short-term adverse impacts to local noise-sensitive receptors (four churches and Mansfield Battle Park) when operations are nearby.	Little or no change in areas baseline ambient sound level.
Vegetation	Preemption of 253 hectares (625 acres) of vegetation for life of mine in ancillary area. Long-term direct adverse impacts to 15,466 acres of primarily upland forest, grassland, and revegetation/cutover areas by vegetation removal incrementally of the 32-year life of mine during mining operations. Downstream and adjacent biotic communities will be adversely affected by alteration of physical and chemical variables associated with clearing activities.	Potential adverse impacts from current trends of converting upland and bottomland forest and shrub communities to managed pine forest/plantation or pastureland or row cropland.
Wetlands	None of the 102.3 hectares (253 acres) delineated as wetlands by the USCE will be directly impacted by mining operations; however, there may be indirect adverse impacts to these and adjacent wetlands as a result of dewatering and ancillary activities.	Potential adverse effects from future timber operations.
Wildlife	The structure and species composition of wildlife communities in the affected areas will be greatly changed; overall diversity throughout the mine areas will be reduced; and some of the more sensitive habitat types cannot or may not be replaced. The extent of adverse impacts on wildlife depends on the effectiveness of the planned and implemented reclamation efforts.	Potential adverse effects from gravel mining and timber operations.
Aquatic Ecology	Adverse impacts to stream through channel realignment, increase in suspended solids, changes in nutrient input, reduction in shade and organic material provided by riparian vegetation, and alteration of flow regime. Solids loading and substrate blanketing will be mitigated by sediment control structures.	Silviculture and oil and gas production are expected to continue, resulting in the present level and nature of impacts to the aquatic environment to continue.
Threatened or Endangered Species	No effect on Red-cockaded Woodpecker.	Project(s) without Federal actions may affect species.
Cultural Resources	Direct adverse impacts to three historic sites. Cultural resources impacts will be mitigated through an MOA.	Potential adverse effects from weathering and vandalism. Knowledge gained through investigation of sites to be impacted would be lost.

TABLE I-1 (Concluded)

Factor	Project Alternatives	No Action Alternative/ Future Without the Project
Population	Both short- and long-term impacts to the local population. Additional increases in secondary work force.	Potential long-term increases to the population caused by future development.
Economy	Both short- and long-term beneficial impacts will result directly from the project (wages, land purchases and capital expenditures). Indirect beneficial impacts will result from employment of secondary workers.	Potential short- and long-term changes possible with future development.
Housing	Short-term adverse impact through increased demand on the area's tight housing market. Long-term beneficial impacts to housing construction and mobile home sales will probably occur.	Potential short-term adverse impacts if future development occurs.
Community Services	Short and potential long-term adverse impacts on already deficient utility systems in all project area towns. Most municipal utility systems may require capital improvements. Increased demand on local community services (police, fire, health care, and schools) may require them to operate above prescribed capabilities. However, tax bases in most local jurisdictions should eventually increase to meet demands.	Possible short- and long-term adverse impacts due to potential future industrializations. Deficient utility systems will require capital improvements with or without the project.
Community Finances	Some possible short-term dislocation due to increased service demands prior to project-related increases in tax revenues. Long-term beneficial impacts to municipal, county, and state finances associated with tax revenues.	Short- and long-term adverse impacts related to the loss of revenue from the proposed project.
Transportation	Adverse impacts on already congested local roads and highways through increased vehicle trips, most notably on U.S. 171, U.S. 84, LA 1, LA 175. Planned construction of I-49, a north south four-lane expressway connecting I-10 and I-20 will help mitigate congestion. Short-term (less than one day) interruption on LA 175 will occur twice in the project to move a dragline.	Potential short- and long-term effects from possible future industrial development.
Land Use	Direct adverse impacts for the life of mine primarily result from conversion of 253 hectares (625 acres) of primarily developed and undeveloped forestland to industrial use. The remaining approximately 6,259 hectares (15,466 acres) will be directly affected by mining but will be reclaimed. An estimated 140 dwelling, one church and one cemetery are within proposed mining blocks. The cemetery will be avoided. Relocation and temporary disruption of two state highways will occur.	Potential long- and short-term adverse impacts from industrial/commercial growth increasing the conversion and loss of agricultural land including undeveloped forest and pastureland. Increased urbanization.

iron-ore gravel is currently being mined within the permit area, and any additional gravel resources within the mine boundaries will be irretrievably lost.

3. Soils

Land clearing prior to construction of mine facilities will create short-term adverse impacts associated with accelerated erosion, particularly on soils with steep slopes. The severity of erosion will be lessened by employing erosion control methods such as seeding, mulching, etc. until exposed areas are revegetated. Soil erosion resulting from mine operations will be short-term because the area will be stabilized following revegetation.

Initially, existing soils would be replaced with selected sandy layers of unoxidized overburden material, or where absent, selected layers from the oxidized zone. The use of unoxidized overburden would create short-term, adverse impacts in surface layers due to low organic matter and microbial content. Production for cultivated crops and pasture may be somewhat limited while pine forests would have good potential. Under worst case conditions, the use of unoxidized overburden as surface material could locally create soils that have a high acid-bearing potential. Such conditions could be detrimental to plant growth. Should such conditions occur, however, Louisiana Office of Conservation Surface Mining Division (LOCSMD) regulations require burying or otherwise treating acid-forming and toxic-forming overburden within 30 days of exposure.

Approximately 3,013 hectares (7,444 acres) within the permit area are designated as prime farmland under Soil Conservation Service (SCS) criteria. These presently designated prime farmlands will be irretrievably lost within the mined area and ancillary construction area, and may be adversely affected in the remaining ancillary area. The cumulative effects of lignite development in the region (i.e., seven power plants and/or mines) represents a major adverse impact on prime farmlands.

About 91.9 hectares (227 acres) have a land-use history that qualifies it as prime farmland under Louisiana Surface Mining Regulations. While all mined land must be returned to equal or better use, LOCSMD regulations require that the prime farmland designated under land-use history be replaced with the original topsoil after mining. DHMV will segregate, stockpile, and replace topsoil that is designated historical prime farmland.

4. Water Resources

Surface-water quality and quantity during construction will incur some short-term adverse impacts on or adjacent to the permit area. Construction will adversely impact existing drainage patterns, overland runoff volumes, peak runoff rates, and sediment loadings. Temporary reductions of streamflow will result in some localized areas (e.g. , below stream diversions), while runoff will increase at other locations such as temporarily denuded areas and streams receiving diverted runoff from other areas. The stream reroutes planned will generally consist of diversions into parallel channels to allow the recovery of lignite in the original channel locations. Approximately 15.9 kilometers (9.9 miles) of temporary and 10.8 kilometers (6.7 miles) of permanent stream diversions will be constructed parallel to existing streams in the permit area over the life of the mine. During construction, the adverse impact of increased runoff and sediment loadings to existing streams will occur. After construction, flow will be diverted to the new streambed, and the original streambed will be mined. Tenmile Bayou will be diverted from the Sabine River Basin into Red River Basin for approximately two years and then permanently rediverted back to the Sabine Basin. For temporary diversions, the impact to the original stream will be short-term as the stream will be replaced following mining. As these temporary diversions will be very localized, long-term effects on downstream flows are not anticipated. Streams diverted into permanent structures will not be replaced, thus resulting in a long-term adverse impact. Measures such as riprap, energy dissipators, etc. will be employed as necessary to minimize adverse impacts. Increases in sediment production resulting from construction activities will cause periodic short-term adverse impacts on water quality. Sediment control measures such as mulches, straw dikes, vegetative filters, and detention basins will be implemented as necessary to minimize sediment production during the construction phase.

During mining operations surface-water hydrologic and water quality characteristics of the site will be subject to continual change as the activities progress. Runoff volumes from the mine site will be temporarily increased as the land is prepared for mining, but contributions to peak discharges downstream of these areas will actually be decreased as a result of the impoundment of runoff in sedimentation ponds. Diversions of overland flow and stream diversions to facilitate mining in specific areas will result in some unavoidable, temporary, but minor localized changes in the runoff of affected watersheds. Adverse impacts of mining on the low flow and flow-duration characteristics of area streams should be minor, as most of the local streams are classified as intermittent and thus exhibit no significant baseflow. As mined areas are reclaimed, hydrologic characteristics will gradually approach premining conditions. Parameters of mine runoff waters that are limited in EPA's NPDES permit for the sedimentation ponds (i.e., total suspended solids, total iron, manganese, and pH) can potentially cause minor impacts on the surface water quality of receiving streams. Constituents in mine runoff waters which are not covered by the New Source Performance Standards (NSPS) (e.g., heavy metals) are not expected to result in water quality problems. Available overburden geochemistry data do not indicate concentrations of toxic substances which would result in major adverse runoff water-quality impacts. Additionally, if such constituents are present in runoff waters, excessive concentrations in discharged effluents will be prevented, in most instances, by pH and total suspended solids control in the sedimentation ponds. Compliance with the applicable permit monitoring and reporting requirements for Louisiana Department of Natural Resources (LDNR) will provide the means for identifying excessive toxic constituent levels in the effluents, at which time appropriate mitigative action will be taken, if necessary. Wastewater sources associated with the mine, such as domestic sewage and vehicle washwater, will cause only minor adverse water-quality impacts as they will comply with applicable water-quality standards.

Construction of ancillary facilities will not cause adverse impacts to either ground-water quality or quantity of the region. Mining operations will remove approximately 48 water wells, all of which were drilled for domestic use. The maximum distance of worst-case adverse impact to the water table elevation by mining will be approximately one-half mile from mining operations. Thus, other wells in the area within the half-mile radius will be subject to a relatively short-term decrease in productivity due to a water-level drawdown. Adverse impacts to the productivity of ground-water wells lying outside one-half mile of the mined area will be minimal. If the radius of influence of two or more mines were to overlap, one possible outcome would be that ground-water drawdowns in the overlap area would be greater than one would expect from a single project separately; therefore, a cumulation of impacts to ground water would result. The permitted Oxbow Mine is located approximately 4 kilometers (2.5 miles) east of the Dolet Hills Project's eastern boundary. Because highly permeable alluvial material will be dewatered at Oxbow, the radius of influence associated with this material is greater than that of the low permeability Wilcox sediments. Mathematically, the radius of influence from dewatering such material could overlap at a 4 kilometer (2.5 mile) distance; however, the alluvial material at Oxbow does not extend into, and will not be mined at Dolet Hills. When the area is reclaimed and the material is resaturated, wells completed into the reclaimed area should be able to produce yields comparable to the existing normal rate of use in the area, but chloride and sulfate will adversely affect the ground-water quality. An analysis of overburden was conducted to examine the acid-forming potential of the material. Only a few zones were identified as having amounts of pyrite capable of causing undesirable acidity. High acidity can create toxic conditions by mobilizing such heavy metal ions as arsenic, manganese, selenium, cadmium, chromium, copper, lead, mercury, nickel, zinc, and vanadium. However, alkalinity exists in most cases at levels sufficient to neutralize any acid which may develop. In addition, heavy metal concentrations are sufficiently low, as indicated by ground-water analysis and results of chemical analysis of overburden samples. It is anticipated that ground-water degradation resulting from the operation of the mine will be limited to the mined area and near vicinity. If any users of surface and/or ground water are subjected to contaminated, diminished, or interrupted supplies as a result of the mining activites, DHMV will replace the affected supplies with suitable alternative sources in accordance with LOCSMD regulations.

5. Air Quality

Construction and operations will cause particulate matter to be emitted into the atmosphere. Emission from these activities will be intermittent and spread out over a large area; most particle settling will occur next to the source. Adverse impacts on air quality will be periodic, local in nature, and minor.

6. Radioactive Emissions

Radon-222 (Rn-222) will be released into the atmosphere as a result of mining operations. The amount of Rn-222 emanated is related to the amount of U-238 present in the soil or the near-surface material being evaluated. The emanation rate is also related to the type and form of material. The radon emanation ratio (ratio of escape to production rate) is approximately 15 percent for coal and up to 70 percent for soils. Other factors which influence the radon emanation rate of materials are moisture content and porosity. Soils have been reported to have an average concentration of U-238 of 1.8 ppm_w. The emanation rate of Rn-222 resulting from exposure of lignite seams during mining operations and storage of lignite at an emanation ratio of 15 percent would not be expected to be greatly different from average soils at an emanation ratio of 70 percent. Therefore, release of Rn-222 by the exposed lignite during mining operations is not expected to be significant and would have negligible public health consequences.

7. Sound Quality

Increased noise levels associated with construction and operations will have periodic short-term adverse impacts on local noise-sensitive receptors (e.g., four churches and Mansfield Battle Park). At mining operations near the Mansfield Battle Park, a $L_{(dn)}$ of 69 dBA is expected, which is an increase of 15 dBA over ambient levels. On a worst-case basis, Antioch Church will experience an increase of 22 dBA over ambient levels. DHMV will schedule, whenever possible, noise-producing activities to avoid scheduled meetings at the Antioch Church. Other measures to lessen noise impacts will be implemented by DHMV. These include using state-of-the-art mining equipment with appropriate noise controls and providing good maintenance practices for the equipment.

8. Ecology

Vegetation

Site preparation and construction within the permit area will remove approximately 253 hectares (625 acres) of vegetation for the life-of-mine in those portions of the ancillary area where offices, workshops, dragline erection pads, haul and access roads, stream diversions (outside mining blocks), etc., will be built. Approximately 102.3 hectares (253 acres) of USCE delineated regulatory wetlands occur in the permit area. None of the delineated wetlands will be directly impacted; however, there may be indirect adverse impacts to these and adjacent wetlands as a result of dewatering and ancillary activities. In order to minimize adverse impacts associated with soil erosion and sediment-loading to plant communities either downstream or adjacent to construction activities, control structures such as sedimentation ponds and hay bales will be located as close as possible to potential sediment sources. Site preparation and construction will produce unavoidable short-term adverse impacts to vegetation left standing adjacent to cleared areas. Primary production in vegetation may be reduced due to dust accumulation on foliage adjacent to construction areas.

During the 32-year life-of-mine, approximately 6,186 hectares (15,466 acres) of primarily upland forest, grassland, and regeneration/cutover areas will be cleared prior to actual mining. Approximately 317 hectares (783 acres) of that total is bottomland forest. Premining clearing will proceed incrementally and will be followed immediately by postmining reclamation. Unreclaimed, disturbed land will average 363 hectares (909 acres) with a maximum of 486 hectares (1,200 acres) of unreclaimed, disturbed land occurring from the year 2000 to 2008. In addition to the direct adverse impacts of vegetation removal, downstream and adjacent biotic communities will be adversely affected by the alteration of physical and chemical variables during operation activities, as well as those impacts associated with construction activities. Lowering of water table elevations will adversely affect wetlands, hillside bogs, and riparian communities in adjacent floodplains that are hydrologically dependent on proposed mine areas. Sensitive areas such as hillside seepage bogs will be lost due to their low probability of being re-established.

Postmining habitats within the 11,968-hectare (29,573-acre) permit area will consist of approximately 88 percent of managed and unmanaged forest (10,523 hectares; 26,023 acres), 10 percent of improved pasture (1,192 hectares; 2,946 acres), 1.8 percent of wildlife habitat (214 hectares; 530 acres), and approximately 0.2 percent of developed water resources including permanent sedimentation ponds and livestock and wildlife watering ponds (30 hectares; 74 acres). Areas within the mined area that are restored to forest will be primarily commercial pine. A cooperative agreement has been signed between the De Soto Soil and Water Conservation District and DHMV for development and implementation of a conservation program (see letter in Part II,B,2).

Wildlife

The primary overall adverse impact of construction and operations activities will be the clearing of wildlife habitat, thereby resulting in the direct destruction of some forms of wildlife that are not mobile enough to avoid clearing activities. Larger, more mobile species of wildlife may immigrate into adjacent habitats and compete with resident individuals, eventually resulting in decreased productivity and/or increased mortality such that populations will be reduced to that which the habitat can support. Loss of wildlife habitat due to stream diversions (outside of mining blocks) will be 3.7 hectares (9.2 acres) of bottomland hardwood forest, 2.5 hectares (6.1 acres) of grasslands, 2.3 hectares (5.9 acres) of regeneration cutover areas, and 2.7 hectares (6.6 acres) of upland pine forest. A total of approximately 317 hectares (783 acres) of bottomland forests will be pre-empted, resulting in the long-term adverse loss of diverse wildlife communities.

Examination of quantitative bird census data on the major habitats of the project area suggests the following generalizations about habitat quality on the site: (1) relatively mature upland forests of the project area contain typical wildlife assemblages of the region, comparable in density and diversity to other similar upland areas; (2) over much of the project area where timber management practices have created young to medium-aged upland forests, wildlife assemblages are also very typical of second growth habitats in the region; (3) within the realm of stand-ages present on the Dolet Hills project area, bird densities and diversities are typically low in clear-cuts and increase with stand age (Meyers and Johnson, 1978); (4) bottomland hardwood forests, which typically have high bird densities and numbers of bird species, apparently show significantly reduced densities and diversities of breeding birds in the project area compared to other areas of bottomland hardwoods. Based on the methodology used in the habitat qualitative assessment (Appendix D), the limited availability of data, and realization that the quality of the habitats in the permit area varies within community types, the following assessments have been made of habitats to be affected by the proposed project:

1. Upland forest quality is fair to good.
2. Clear cut forest quality is fair to good.
3. Bottomland hardwood forest quality is fair at best.

The extent of adverse impacts on wildlife depends on the effectiveness of the planned and implemented reclamation efforts. However, it appears that certain habitats such as mature pine-beech forest, the limited swamps, and most of the bottomland hardwoods will not be replaced. Overall diversity throughout the mined areas will be reduced. The structure and species composition of wildlife communities in the affected areas will be greatly changed resulting in a major adverse long-term impact on the wildlife resources of the area. The areal extent and location of area available for restoration to wildlife habitat is severely restricted by landowner preference for post-mining land uses conducive to forestry/agricultural production (50 percent will be planted in pine only; 13 percent will be planted in pasture only; and 37 percent will be planted in grass or pine seedlings only). LOCSMD requires that an acceptable fish and wildlife plan be developed and implemented by DHMV prior to the removal of any overburden. The fish and wildlife plan is a part of the approved Surface Mining Permit Application. Mitigation measures that are being developed as part of the fish and wildlife plan include:

1. Restoration of all streambeds and associated aquatic habitats (where possible) in their original location after temporary diversion.
2. Creation of all new streambeds and associated aquatic habitats (where possible) in permanent diversions.
3. Restoration of riparian habitats.
4. Possible future restoration of leased land to fish and wildlife habitat, pending landowner agreements (lease requirements).
5. Restoration of future mine leases to fish and wildlife habitat, where possible.
6. Use of sedimentation ponds.
7. Use of erosion control.
8. Conveyor design
    a. dust cover and dust suppressant
    b. raised bottom/low height design to reduce the barrier potential to wildlife traversing the project site
    c. crossings at transfer points and roads
    d. belt flip over.
9. Dust suppressant
    a. watering
    b. mulching
    c. vegetation cover.

10. Mining sequence to delay adverse impacts to sensitive habitats (e.g., bottomland hardwood forests) in the mine permit area as long as possible.
11. Use of approved bridges, culverts, etc. for stream crossings.
12. Monitoring of land reclamation and revegetation.
13. Establishment of fish and wildlife habitat as primary postmining land use of the approximately 203 hectares (500 acres) of fee land to be mined.
14. Creation of new ponds and related aquatic habitat.
15. Establishment of fish and wildlife habitat along rights-of-way.
16. Provide more edge habitat than currently available.

The fee land listed in item 13 above is distributed in the eastern and western portions of the permit area in 4.0-32.4 hectare (10-80 acre) tracts. The fish and wildlife plan, which is being developed in cooperation with LDWF, includes the restoration of fish and wildlife habitat on fee lands as well as along streams, permanent postmining ponds, etc. In fee land areas where the existing habitat is poor quality, the restored habitat will be improved through accepted management techniques. These areas will be planted with tree and shrub species that are preferred for wildlife food and cover.

Before Surface Mining Permit issuance and commencement of mining operations, a performance bond sufficient to assure reclamation must be filed with LOCSMD. This performance bond shall continue for a minimum of five years after all reclamation has been completed. The bond, or portions thereof, will be released only if reclamation meets the required State standards. Frequent inspections and monitoring of mining operations will be conducted by LOCSMD. In addition, the Surface Mining Permit must be reviewed for adequacy a minimum of every five years and appropriate revisions may be required.

The cumulative effects of lignite development in the region constitute an irretrievable commitment of the more sensitive wildlife habitat types (e.g., marshes, swamps, bogs, etc.) that cannot or may not be fully re-established after reclamation.

In July 1982, EPA requested that the U.S. Fish and Wildlife Service (FWS) provide a list of threatened and endangered species that might occur within the project vicinity. The FWS responded that the Red-cockaded Woodpecker may occur in the area and that a Biological Assessment was required. A Biological Assessment of the entire mine area (32 years) was prepared by EPA to consider the possible effects of the proposed surface lignite mine on the Red-cockaded Woodpecker. As a result of this Assessment, EPA determined that there would be "no effect" on the Red-cockaded Woodpecker. This determination was provided to the FWS (Jackson, Mississippi). FWS concluded that the woodpecker would not be impacted by the proposed mining activity as currently planned since there appears to be no suitable habitat within the permit area. The FWS stated that Section 7 of the Endangered Species Act has been fulfilled but that further coordination should be initiated if modifications are made in the project, or if additional information concerning potential impacts to the woodpecker becomes available (see letter in Part II, Section B of this document).

Aquatic Ecology

Construction and mining activities will adversely impact streams of the project site through: 1) destruction of existing stream channels (e.g., channel realignment); 2) increases in suspended solids loading; 3) changes in nutrient inputs; 4) reduction in the shade and organic material provided by riparian vegetation; and 5) alteration of the flow regime. Outside the permit boundaries, categories 2), 3), and 5) could be expected to produce adverse impacts on the downstream segments of these water courses.

Stream diversions will be constructed on Chatman and Tenmile bayous in the Sabine River drainage and on West Branch, Dolet, Louies, and Prairie bayous in the eastern mining area in the Red River drainage. Chatman, Tenmile, Louies, and Prairie bayous will be permanent diversions. These existing aquatic habitats (10,744 meters; 35,250 feet) will be lost, constituting a long-term adverse impact. Populations of aquatic plants and animals should develop over the long-term in the new permanent diversions and mitigate some of the losses.

9. Cultural Resources

Eighteen percent (approximately 2,154 hectares or 5,323 acres) of the permit area has been surveyed and a total of 59 cultural resources within the mine permit boundaries have been recorded. This includes 13 archeological sites, 10 standing structures, 27 possible archeological sites, 7 isolated occurrences, and 2 historic cemeteries. Mansfield Battle Park, located adjacent to and west of the permit boundary, is currently listed on the National Register of Historic Places (NRHP). No known cultural resource sites within the surveyed portion are listed on the NRHP. One historic standing structure, used during the Civil War, has been nominated to the NRHP, and its approval is presently pending in Washington, D.C. Four additional standing structures are recommended for further work to determine their potential eligibility for nomination to the NRHP.

Operations will not come closer than 91 meters (300 feet) to Mansfield Battle Park. Of the sites recommended for further evaluation, two are within the ancillary activities area but should not be directly impacted by construction activities. In addition, surveys of the remaining permit area may reveal additional cultural resources within the impact area that may be eligible for nomination to the NRHP. A Proposal for Agreement was signed by EPA and the Louisiana State Historical Preservation Officer, and forwarded to the Advisory Council on Historic Preservation. This Proposal is to become the Memorandum of Agreement (MOA) when ratified by the Council (see Appendix B of this document). Compliance with the MOA, as a condition of the NPDES permit, will satisfy the requirements of Section 106 and adequately protect cultural resources. Cumulatively, an overall beneficial impact may be derived from the expansion of knowledge regarding past cultures gained through surveys provided with Section 106 compliance from this and other Federal projects in the region.

10. Socioeconomics

Only about 22 of the peak 112 construction workers during 1984-1985 are anticipated to be hired from the local labor force. Based upon similar energy-related worker profiles and existing characteristics of the project area, approximately 45 will in-migrate to communities in the area, and another 45 will commute from Shreveport. The 67 locally residing construction workers could provide approximately 54 secondary jobs; increased population associated with in-migrating primary and secondary workers and their families will be 114 and 124, respectively. The project area average vacancy rate for owner-occupied housing is extremely low. Mobile homes are likely to be the predominant form of housing for in-migrating construction workers. Expansion of housing is constrained by deficiencies in utility infrastructure in all area towns. Most project-area municipal utility systems may require capital improvements if project-related housing, water, and sewage needs are to be met. The total of 238 in-migrants related to project construction may cause some local community services such as police and fire protection, health facilities, and schools to operate above their prescribed capacities, resulting in adverse impacts.

Construction of the proposed mine project will create adverse increases over existing traffic levels along U.S. 84 and 171 and LA1 and 175. Some roads in the area are approaching or have exceeded design capacity.

Projected labor expenditures over the 3.5-year construction period are estimated at $4.9 million, with $2.45 million occurring in the peak construction years. Secondary income could account for an additional $3.75 million in the project area. Project expenditures for equipment, materials, and other nonlabor requirements will be an estimated $63.2 million. Of the $51.1 million to be spent on machinery, materials, power, and fuels, it is estimated that about seven percent, or $3.46 million, will be spent locally. Local secondary income from nonlabor expenditures could amount to about $8.7 million.

During Phase I of the full operations phase (1986-1992) of the proposed project, a maximum of 213 workers will be employed, of which 90 percent will be in-migrants. Phase II of operations (1993-2017) will increase the operations work force to 400 employees. This peak level operations work force of 400 would support about 600 secondary jobs. However, a number of construction-induced workers will probably remain in the area after termination of the construction phase, and thus could fill both operations-induced primary and secondary jobs locally.

At full operation of the mine, operations employees and their families would add about 1,199 persons to the surrounding parish area population. It is projected that approximately 70 percent of in-migrating workers will seek single family housing. Adverse impacts resulting from the increased population could include: a demand for adequate housing upon already low housing stocks in the early years of operation; the need to improve water and wastewater systems; and the need to expand community services.

Average annual direct operations expenditures are estimated at $23.28 million per year between 1986-1992, and $56.9 million per year between 1993-2017 (1981 dollars). Salaries paid to local employees will amount to about 27 percent of total annual costs. Local secondary income to the area resulting from operations workers consumer expenditures is estimated to amount to an annual average of about $7.6 million and $14.1 million for Phases I and II, respectively. Approximately seven percent of machinery, materials, power, and fuels expenditures will be spent within the project area for a total of about $658,000 per year during Phase I and $1,750,000 per year during Phase II operations. In addition, between $1.33 and $3.54 million in annual local secondary income effects will result from non-labor operations expenditures. During the operations phase of the project, up to $148,000 per annum in property taxes (based on 1981 tax rates and assuming 100 percent valuation) will accrue to local taxing jurisdictions, principally the county and school district. Ad valorem taxes would also accrue to local governments as a result of worker ownership of residential property. Sales taxes would generate additional revenue for area municipalities.

Operations will increase vehicular traffic on already congested roads, and the relocation of LA 522 may cause temporary disruption of traffic on that roadway.

Adverse visual impacts will be experienced by some travellers on LA 175 and 522 when operations commence in those areas. These impacts will be short-term as land will be reclaimed after mining.

11. Land Use

The lignite project will convert approximately 253 hectares (625 acres) of primarily developed and undeveloped forestland to industrial use. Indirect land-use impacts include changes resulting from residential construction and associated utilities installation for construction-related in-migrants. Approximately 6,259 hectares (15,466 acres) will be directly affected by mining, including 2,883.5 hectares (7,125 acres) of undeveloped forest, 2,655 hectares (6,561 acres) of developed forest, 601 hectares (1,484 acres) of pastureland, 79 hectares (195 acres) of cropland; 32 hectares (79 acres) of grazing land, 4 hectares (9 acres) of water, 2.5 hectares (6.2 acres) of residential land, and 2.5 hectares (6.2 acres) of commercial-industrial land. An estimated 140 dwellings, one church, and one cemetery are located within the proposed mining blocks. All cemeteries within the permit area will be avoided, and no mining activities will approach within 30.4 meters (100 feet) of a cemetery; access will be maintained. Mining in the northwest portion of the site will require the partial relocation of LA 522. A conveyor system will cross LA 175 until the southwestern section of the permit area has been mined. In addition, a temporary disruption of highway traffic will occur twice during mining operations to move two draglines. Discussions regarding schedules and procedures are currently underway with the Louisiana Department of Transportation and Development.

The five pipelines found in the permit area will be relocated prior to mining. Schedules and procedures for all relocations will be agreed upon with pipeline operators. Production activities at the estimated 60 oil and gas wells located inside the permit area will be discontinued during mining activities and resumed following reclamation, at the well operator's direction. Water lines associated with the East De Soto Water System in the southeast portion of the site near LA 346 will be relocated as necessary.

The effect of removing approximately 2,655 hectares (6,560 acres) of forestland from production in the proposed mining blocks can be assessed by estimating production and value of standing pine on the site. Potential production for De Soto Parish is estimated at two cords per acre per year of pine pulpwood, or 500 to 1,000 board feet per year of pine sawtimber. Values (1981 dollars) are estimated to be $12 to $18 per cord or $200 to $280 per 1,000 board feet. Therefore, a loss of $157,440 to $1,836,800 per year is possible due to the proposed project. The lesser figure assumes utilization of forested areas for pulpwood, while the higher figure assumes utilization for sawtimber. At the present time, approximately 70 percent of the commercial forestland within the permit area is suitable for pulpwood production, and 30 percent is mature enough for sawtimber.

PART II

CONSULTATION AND COORDINATION

PART II CONSULTATION AND COORDINATION

On 4 February 1983, the Notice of Availability of the Supplemental Draft Environmental Impact Statement (SDEIS) for the proposed Dolet Hills Lignite Mine Project in De Soto Parish, Louisiana was published in the Federal Register (Vol. 48, Page 5308). Approximately 200 copies of the SDEIS were distributed to Federal and State agencies and to other interested organizations and individuals.

Comments received during the public review period are presented in Part II, Section A. Letters, notices, and other coordination documentation are presented in chronological order at the end of each subsection of Part II, Section B which supplements Section 5.0, Coordination, of the SDEIS.

A. COMMENTS AND RESPONSES TO THE SDEIS

The following letters were received during the 45-day review of the SDEIS. EPA's responses to numbered comments immediately follow each letter.

Department of Transportation and Development

P. O. BOX 44245 CAPITOL STATION
BATON ROUGE, LA. 70804

(504) 342-7520

PAUL J. HARDY
SECRETARY

DAVID C. TREEN
GOVERNOR

February 16, 1983

ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENTAL DRAFT
DOLET HILLS LIGNITE MINE PROJECT
DE SOTO PARISH

Mr. Clinton B. Spotts
Regional EIS Coordinator
U. S. EPA, Region 6
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

In response to EPA's request for comments dated January 19, 1983 we offer the following:

> The only comment the Louisiana Department of Transportation and Development has to offer at this time pertains to permits. A permit is required from the Department for any work to be performed within the right-of-way limits of a state highway.

Should you have any questions, please contact Mr. P. J. Frederick, Chief Maintenance and Operations Engineer.

Sincerely,

V. Pizzolato

VINCENT PIZZOLATO
PUBLIC HEARINGS AND
ENVIRONMENTAL IMPACT ENGINEER

VP/DJW/jr

cc: Mr. Neil L. Wagoner
Mr. Dempsey White
Mr. Jack R. Reid
Mr. Frank M. Heroy, Jr.
Mr. P. J. Frederick
Mr. James Forbes
FHWA

RECEIVED
FEB 22 1983
6 ES

RESPONSE TO COMMENTS

FROM: Department of Transportation and Development
P.O. Box 44245 Capitol Station
Baton Rouge, Louisiana 70804

16 February 1983

Comment	Response
General	Comment acknowledged.

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
P. O. BOX 3929
BATON ROUGE, LOUISIANA 70821

REGION 6

February 16, 1983

IN REPLY REFER TO
EPA Supplemental Draft EIS
Dolet Hills Lignite Mine Project
DeSoto Parish, Louisiana

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

We have reviewed the subject draft EIS and have no comments to offer.

Sincerely yours,

For:
J. N. McDonald
Division Administrator

RECEIVED
FEB 22 1983
6 ES

RESPONSE TO COMMENTS

FROM:
U.S. Department of Transportation
Federal Highway Administration
P.O. Box 3929
Baton Rouge, Louisiana 70821

16 February 1983

Comment	Response
General	No response necessary.

Department of Transportation and Development

P. O. BOX 44245 CAPITOL STATION
BATON ROUGE, LA. 70804

PAUL J. HARDY
SECRETARY

DAVID C. TREEN
GOVERNOR

February 18, 1983
(504) 342-7511

ENVIRONMENTAL IMPACT STATEMENT
SUPPLEMENT DRAFT
DOLET HILLS LIGNITE MINE PROJECT
DE SOTO PARISH

Mr. ClintonB. Spotts
Regional EIS Coordinator
US EPA, Region 6
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

In response to EPS's request for comments, dated January 19, 1983, we offer the following:

Since you state on page 1-8 that, "Planned construction of I-49, a north south four lane expressway connecting I-10 and I-20 will help mitigate congestion", we expect no conflicts with your proposed project and this Department's I-49 highway project presently under design. We will be happy to furnish you our latest design on this project if you deem it necessary.

If we may be of additional assistance, please advise.

Sincerely,

Heroy Jr.

FRANK M. HEROY, JR.
CHIEF DESIGN ENGINEER

FMH,jr.:DJW:si
c: Mr. Neil L. Wagoner
Mr. Dempsey D. White
Mr. Jack R. Reid
Mr. Vincent Pizzolato
Mr. James Forbes
Federal Highway Administration

FEB 23 1983

6 ES

RESPONSE TO COMMENTS

FROM:
Department of Transportation and Development
P.O. Box 44245 Capitol Station
Baton Rouge, Louisiana 70804

18 February 1983

Comment	Response
General	No response necessary.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FORT WORTH REGIONAL OFFICE
221 WEST LANCASTER AVENUE
P.O. BOX 2905
FORT WORTH, TEXAS 76113

REGION VI

IN REPLY REFER TO:

March 2, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
Region 6
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, TX 75270

Dear Mr. Spotts:

The Supplemental Draft Environmental Impact Statement for the Dolet Hills Lignite Mine Project in DeSota Parish, Louisiana, has been reviewed in the Department of Housing and Urban Development's New Orleans Area Office and Fort Worth Regional Office, and it has been determined that the subject document adequately addresses this Department's special areas of environmental concern.

Sincerely,

Victor J. Hancock
Environmental Clearance Officer

RECEIVED
MAR 31 1983
6 ES

RESPONSE TO COMMENTS

FROM: Department of Housing and Urban Development
Fort Worth Regional Office
221 West Lancaster Avenue
P.O. Box 2905
Fort Worth, Texas 76113

2 March 1983

Comment	Response
General	No response necessary.

Post Office Box 5083
Tulane University Station
31 McAlister Drive
New Orleans, Louisiana 70118

RECEIVED
MAR 15 1983
6 ES

March 8, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency, Region 6
1201 Elm Street
Dallas, Texas 75270

Regarding : Comment on and Objection to the Dolet Hills Surface Mine Supplemental EIS

Mr. Spotts,

(1) The Dolet Hills Lignite Mine Project EIS Supplemental Draft states (P.1-1):

" Taking no action was evaluated, in addition to numerous mine and transportative systems designs and alternative energy sources. Energy sources such as geothermal, solar, wind, coal, and petroleum gasification, natural gas, and western coal were evaluated and eliminated as being technologically infeasible at present, or not cost-effective (EPA 1981) ".

(2) Such a claim of cost efficiency of the Dolet Hills venture for area power generation using lignite as a fuel base is unsubstantiated, and, without unbiased factual documentation, is an arbitrary conclusion.

(3) Moreover, there exists information and data indicating such a claim of economic utility (and thus, preference) for the Dolet Hills lignite mining/burning proposal to also be in error.

(4) Dow's recent withdrawal of all regulatory agency applications for its Castor Bayou project (also in DeSoto Parish) is an acknowledgment of the cost infeasibility of lignite-based fuel supply ventures in Louisiana and is accompanied by the admission : " Recent economic trends have reduced the need for coal production not only in Louisiana, but nationally. "

(5) The Environmental Defense Fund's computerized

analysis of cost/effectiveness in coal investment for power utilities demonstrates end-use efficiency of alternative power supply schemes to be superior to that of lignite-based generation (with a significant cost improvement).

(6) The Dolet Hills environmental impact analysis must consider and address all effects of the project, including impact upon power availability/cost to consumers within the SWEPCO/CLECO supply network; environmentally-sound planning and development (and hence unrestrained competing usage) of lands within this power distribution system is directly tied to such availability/cost.

(7) In my standing as a property owner in DeSoto Parish (Logansport/Bethel) upon whose properties the Dolet Hills venture will have economic, and hence environmentally-determinative, impact, I hereby enter objection to the conclusion of the SEIS as stated in item (1), the objection based upon the lack of evidence to justify such a conclusion on any but a capricious and arbitrary basis. I thus also enter a request for development, and incorporation into the EPA impact evaluation, of a full cost/benefit analysis of the Dolet Hills project (including its electrical service/cost impact, ie. unit cost, ie. rate increase projection, etc. - and consequently its effect upon land-use and environmental integrity of service area lands). Such an analysis must take into account all alternative power generation systems.

Prior commitments will probably prevent my attendance at the March 15 Mansfield public hearing on the Dolet Hills project. If there are any questions regarding this objection or request, feel free to contact me via mail or at (504) 865-5631.

Sincerely,

Daniel T. Morris

RESPONSE TO COMMENTS

FROM: Daniel T. Morris
Post Office Box 5083
Tulane University Station
31 McAlister Drive
New Orleans, Louisiana 70118

8 March 1983

Comment	Response
(1),(2),(3)	The Dolet Hills Power Plant Project Draft EIS, Final EIS, and EPA Record of Decision were published in October 1981, April 1982, and September 1982, respectively. The Supplemental Draft Environmental Impact Statement (SDEIS) was prepared to assess the impacts of EPA's New Source NPDES permit actions pertaining only to the Dolet Hills Lignite Mine Project. The purpose of the SDEIS was to evaluate proposed and alternative methods of mine construction and operation activities; therefore, power plant fuel alternatives are given only a cursory treatment in that document. The justification for the selected fuel source (lignite) is presented in the Dolet Hills Power Plant Project EIS (EPA, 1981).
(4)	Acknowledged, "Recent economic trends have reduced the need for coal production not only in Louisiana, but nationally". However, reference to the Castor Bayou Project (also in De Soto Parish) would not indicate the cost infeasibility of all lignite-based fuel supply ventures (i.e., power plants) but rather a possible indication of the present infeasibility of lignite gasification projects.
(5)	An attempt was made to locate the referenced study. The Environmental Defense Fund's Washington, D.C. office and their Boulder, Colorado office are not aware of an Environmental Defense Fund prepared computerized analysis of cost/effectiveness in coal investment for power utilities (Michael Koved. 8 April 1983. Personal communication. Environmental Defense Fund, Boulder, Colorado).

RESPONSE TO COMMENTS

FROM:
Daniel T. Morris
Post Office Box 5083
Tulane University Station
31 McAlister Drive
New Orleans, Louisiana 70118

8 March 1983

Comment	Response
(6)	Environmental impacts of the Dolet Hills Power Plant were presented in the Draft EIS entitled "Environmental Impact Statement, Dolet Hills Power Plant Project, Northwestern Louisiana" (October 1981, EPA 906/9-81-004).
(7)	Since there are no Federal funds involved, a benefit/cost analysis is not within the scope of EPA's environmental review. However, reasonable project alternatives are evaluated for specific environmental concerns including effects on land use (see Part I in this document).

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

Centers for Disease Control
Atlanta GA 30333
(404) 452-4095

March 14, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

We have reviewed the Supplemental Draft Environmental Impact Statement (EIS) for the Dolet Hills Lignite Mine Project in DeSoto Parish, Louisiana. We are responding on behalf of the U.S. Public Health Service.

Air Quality

1. A brief statement should be made in the EIS about the significance to human health of the radioactive emissions from the project site.

2. Noise

a. We are concerned about the adverse noise impacts of the proposed project. We believe every effort should be made to mitigate any adverse noise effects to humans (sensitive receptors) that will be subjected to project-induced outdoor noise levels at or above the 65 day-night sound level (Ldn). According to the worst-case scenario, the day-night sound levels ". . . associated with mining operations are expected to range from 57 to 76dBA at thirteen of the sixteen baseline noise receptor locations. These levels represent an increase in the ambient sound level of between 3 and 22dBA." In view of the ambient noise level increases, the EIS should portray Ldn noise contours for 55dBA, 65dBA, and 75dBA around the study area and describe the number and types of sensitive receptors in each of these noise impact zones.

b. According to the EIS, the predicted ". . . increases in noise levels present a potential major problem because of possible conflicts with and/or disruptions of nearby routine or planned activities, not because of public health concerns." This conclusion appears to be based solely upon the fact that the equivalent sound levels (Leq) for the project ". . . will not exceed 70dBA at any of the receptors for a 24-hour period." While the 70 Leq (24) is an equivalent sound level derived for purposes of protection against hearing loss, it is based upon intermittent noise and 8-hour daily exposures corrected to a 24-hour period. Since all of the proposed mining operations will ". . . occur on a 24-hour per day basis," is the operational noise considered intermittent or continuous as defined by EPA's Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (ILEN), March 1974? If the 24-hour mining operation is considered to produce continuous noise to any offsite receptors, a lower value than 70 Leq (34) will have to be considered (ILEN, page 20) in the EIS's noise evaluation.

c. For satisfactory protection of "public health concerns" from environmental noise, ". . . Maximum Exposure Levels . . ." have been identified by EPA (ILEN, pages 18 to 24 and D-36) ". . . To Avoid Significant Adverse Effects." "Accordingly, Ldn of 45dB indoors and of 55dB outdoors in residential areas are identified as the maximum levels below which no effects on public health and welfare occur due to interference with speech or other activity. These levels would also protect the vast majority of the population under most conditions against annoyance . . . ." While "HUD, DOT and EPA recognize Ldn 55dB as a goal for outdoors in residential areas in protecting public health and welfare with an adequate margin of safety" (Guidelines for Considering Noise in Land Use Planning and Control, Federal Interagency Committee in Urban Noise, EPA, DOT, DOD, HUD, VA, June 1980, page 5), it is not a regulatory goal. However, this criterion level can be used by the locally affected community to incorporate public health and welfare goals into the planning process and to minimize adverse cumulative noise impacts in the future. Where possible, efforts should be made to meet this outdoor noise goal in the project vicinity.

d. The EIS (page 5-67) indicates that for residences, HUD considers ". . . Ldn's above 65dBA and not exceeding 75dBA . . . normally acceptable . . . ." This is contrary to the statement on page 1 of HUD's Interim Noise Assessment Guidelines, 1980 (Contract No. H-2243R, BBN Report No. 4003 R), which categorizes a DNL (Ldn) above 65 but less than 75 decibels as "Normally Unacceptable" for residential land uses.

3. Vectors

The EIS should indicate what measures will be taken at the project site to prevent the unnecessary creation of mosquito breeding areas during mining operations and to satisfactorily control mosquito breeding in the temporary and permanent sedimentation ponds, ditches and diversion channels. It is important that this project not be allowed to increase any local vector populations capable of causing vector-borne disease or nuisance problems. The EIS should include a brief history of vector-borne disease and nuisance problems that have occurred in the area and the local efforts to mitigate these problems. In view of the potential vector habitat areas to be created by the applicants, it may be advisable for the applicant to develop a vector control management plan and have it approved by the local health department.

4. Ground Water

We understand that mining operations will remove approximately 48 water wells which were drilled for domestic use and will adversely impact the water table elevation within a one-half mile of the mining area. The number of existing domestic wells to be adversely impacted because of drawdown or ground water quality effects should be described with a program for mitigating any potable water supply problems if necessary in the interim until corrective measures are implemented and the aquifer of concern has recovered. While the Dolet Hills Mining Venture ". . . will replace the affected supplies with suitable sources in accordance with LOCSMD regulations," does sufficient background data exist on the quality, productivity, and elevation of the local domestic wells to determine if a well has been adversely affected, i.e., ". . . contaminated, diminished or interrupted . . . as a result of the mining activities" (EIS, page 1-12)?

5. Alternatives

In the discussion of the "No-Action Alternative," impacts are stated to occur under the "Ground Water" factor from "potential future lignite mining in the project region . . ." and under other factor headings from other future developments. Some of these impacts are not unique to the "No-Action Alternative" but are universal for all project alternatives and therefore should probably not be incorporated in the chart under one alternative.

We appreciate the opportunity to review the Draft EIS. Please send us one copy of the final document when it becomes available. Should you have any questions about our comments, please contact Mr. Robert L. Kay, Jr., or me at FTS 236-6649 or 236-4095 respectively.

Sincerely yours,

Glyn G. Caldwell, MD for

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Divison
Center for Environmental Health

RESPONSE TO COMMENTS

FROM: Department of Health and Human Resources
Public Health Service
Center for Disease Control
Atlanta, Georgia 30333

14 March 1983

Comment	Response
(1)	A statement pertaining to the significance to human health of the radioactive emissions from the project site is contained in the summary (Part I) and on page III-30 of the SFEIS.
(2)	There are no Federal regulations limiting environmental noise levels associated with industrial or mining operations. The OSHA regulates occupational noise. These standards require that ground level noise sources be attenuated to 90 dBA at a distance of 6 to 10 feet in areas where human receptors are present for 8 hours or more. Overhead sources must be attenuated to 85 dBA at a distance of 60 feet.

The EPA has identified levels of noise below which there is no reason to suspect the general public will be at risk from noise effects (USEPA 1978). These identified levels are not considered standards, regulations or guidelines because the technical and economic feasibility of bringing the United States, in the areas identified below, down to these identified levels was not included in the Congressionally mandated study. Without such economic and technological implementation data, these identified levels should be used for broad planning purposes at the state and local levels. The levels presented below summarize the EPA work; a five (5) decibel margin of safety should be added to each of these tabulated levels.

Yearly L_{dn} values established to protect public health and welfare with a margin of safety:

Effect	Level	Area
Hearing	$L_{eq}(24) \leq 70$ dBA	All areas (at the ear)
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dBA	Outdoors in residential areas and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.

RESPONSE TO COMMENTS

FROM:
Department of Health and Human Resources
Public Health Service
Center for Disease Control
Atlanta, Georgia 30333

14 March 1983

Comment | Response

Effect	Level	Area
	$L_{eq}(24) \leq 55$ dBA	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \leq 45$ dBA	Residential areas (indoor).
	$L_{eq}(24) \leq 45$ dBA	Other indoor areas with human activities such as schools, etc.

Source: USEPA. 1978. Protective noise levels. EPA 550/9-79-100. Washington, D.C., variously paged.

(a) Due to the transient nature of mining activities, developing noise level contours would not be feasible. The contour pattern would change as each mining activity progressed through the various pits. Levels at the Antioch Church are a worst-case calculation based on all noise-producing machines working at the same time, etc., and any impact will be short-term when mining activities occur along the pit boundary.

(b) The operational noise associated with mining activities is considered intermittent. (EPA. 1971. Noise from construction equipment and operations, building equipment, and home appliances. Report No. PB-206717. National Technical Information Service. Washington, D.C.) In calculating operational sound levels for various pieces of mining equipment, EPA-recommended usage factors (percentage of time a piece of equipment is in operation) were employed. Hence, the level of intermittent noise identified for purposes of protection against hearing loss is: L_{eq} (24) = 70 dBa. (EPA. 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. Report No. 550/9-74-004. Washington, D.C.).

RESPONSE TO COMMENTS

FROM: Department of Health and Human Resources
Public Health Service
Center for Disease Control
Atlanta, Georgia 30333

14 March 1983

Comment	Response
	To lessen impacts to sensitive receptors, DHMV will schedule, whenever possible, noise-producing activities to avoid scheduled meetings at the Antioch Church. Other measures to lessen noise impact will be implemented by DHMV. These include using state-of-the art mining equipment with appropriate noise controls and providing good maintenance practices for the equipment.
(c)	Comment acknowledged.
(d)	Concur. As referenced, this has been changed to "normally unacceptable" (see page III-31 of this document).
(3)	Vector-borne diseases include viral encephalitis, Rocky Mountain spotted fever, malaria, tularemia, and dengue fever. Occurrences of these diseases are monitored by the State. Viral encephalitis and Rocky Mountain spotted fever are the two most important vector-borne diseases in Northwestern Louisiana (Personal communication. 21 April 1983. Dr. Louise McFarland, State Epidemiologist, Louisiana Department of Health and Human Resources (LDHHR)). Periodic outbreaks of viral encephalitis occur in Louisiana. The State is subject to the St. Louis strain, the Eastern strain, and, as of 1982, the California strain of viral encephalitis. Rocky Mountain spotted fever, which is transmitted by ticks, has only recently become an important disease in Louisiana (Personal communication. 20 April 1983. Roy Hays, State Public Health Entomologist, LDHHR). When a vector-borne disease case is reported, LDHHR reports this information in a monthly morbidity report and alerts their Vector Control Program personnel to take appropriate action. De Soto Parish does not have a vector control program. Should a vector-borne disease case occur, LDHHR would provide appropriate equipment and personnel to the parish.

COMMENT RESPONSE

FROM: Department of Health and Human Resources
Public Health Service
Center for Disease Control
Atlanta, Georgia 30333

14 March 1983

Comment	Response
	Permanent sedimentation ponds will be stocked with selected species of fish for the establishment of a game fish community in the ponds. Populations of small fish, as well as larger species of fish in their juvenile stages, should aid as vector controls in permanent ponds. Vector controls for other water facilities (e.g., temporary sediment ponds, diversion ditches, etc.) are not planned at this time, but may be implemented if necessary after commencement of mine operations. If needed, insecticides would be applied according to label instructions.
(4)	Considerable baseline data on the quality productivity, and elevation of wells potentially affected by the project is presented in "Geologic Hydrogeologic Baseline Report, Dolet Hills Lignite Project" (EH&A, 1980). A total of 197 water wells located within and adjacent to the mine project were identified and the owner, location, year completed, depth, diameter, surface elevation, static water level, method of lift, water use (e.g., domestic, stock, industrial, etc.), and water-bearing formation were documented. Quarterly water quality samples were collected for one year from wells that were representative of the two major water-bearing formations (i.e., Dolet Hills Formation and Naborton Formation) in the project area.
(5)	Concur. The SDEIS has been revised to distinguish between the No-Action Alternative and the future without the project. See pages III-19, III-20, III-22, III-25, III-26, III-29, III-32, III-35, III-43, III-45, III-48 and 49, and III-50 of this document.

United States
Department of
Agriculture

Soil
Conservation
Service

3737 Government Street
Alexandria, LA 71301

March 16, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency
1201 Elm Street
Dallas, TX 75270

Dear Mr. Spotts:

RE: Supplemental Draft EIS
Dolet Hills Lignite Mine Project
DeSoto Parish, Louisiana

We have reviewed the referenced supplemental draft EIS and offer these comments.

This project will directly and adversely impact 68 acres of prime farmland as defined by Louisiana Surface Mining Regulations.

Table 4-4 presents information on planting dates and seeding rates for pastureland species. Several of these items need revision. This data should conform to the planting dates and seeding rates presented in Table 5.1-3 found in the Surface Mining Permit Application (LSM-3), September, 1982, submitted by the Dolet Hills Mining Venture.

We appreciate the opportunity to provide these comments.

Sincerely,

Harry S. Rucker
State Conservationist

cc: Peter C. Myers, Chief, SCS, Washington, D.C.
Thomas G. Rockenbaugh, Assistant Chief, SW, Washington, D.C.
Billy M. Johnson, Director, SNTC, Fort Worth, TX

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RESPONSE TO COMMENTS

FROM:

United States Department of Agriculture
Soil Conservation Service
3737 Government Street
Alexandria, Louisiana 71301

16 March 1983

Comment	Response
General	Comment acknowledged. Table 4-4 of the SDEIS has been revised to reflect this comment. See pages III-17 and III-18 of this document.

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State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
POST OFFICE BOX 15570
BATON ROUGE, LA. 70895

JESSE J. GUIDRY
SECRETARY
(504) 925-3617

DAVID C. TREEN
GOVERNOR

(504) 342-9245
March 18, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
EPA, Region 6
1201 Elm Street
Dallas, Texas 75270

Re: Supplemental Draft
Environmental Impact Statement
Dolet Hills Lignite Project

Dear Mr. Spotts:

Personnel of the Louisiana Department of Wildlife and Fisheries have reviewed the above referenced project and offer the following general comments with detailed comments attached.

This agency has had the opportunity to review the applicant's application for the Louisiana surface mining permit. From this review, we noted numerous differences between the application and the supplemental draft. We strongly recommend that these differences be reconciled.

The project as described will result in significant adverse impacts to fish and wildlife resources. These resources will neither be restored nor enhanced by the proposal. This agency cannot issue a letter of no objection or concurrence to the proposal until these impacts are mitigated.

We appreciate the opportunity to review this proposal.

Sincerely,

Jesse J. Guidry

Jesse J. Guidry
Secretary

JJG/FOD/fsb
cc: Dr. T. B. Ford
Enclosure

An Equal Opportunity Employer

1. Sections 1.3, 4.3, 4. and 4.4.1.5. The description of the conveyor system lacks typical drawings of profile, cross sections, route and pollution control measures. The conveyor system should be provided with crossings specifically for wildlife and incorporate measures to insure protection from pollution caused by coal dropping from the system. These measures could include flipping the return portion of the conveyor belt.

2. Section 1.3. Additional information on the protection of the mine area by levees is needed. This should include a discussion of the amount of increased flooding which may be caused by these levees.

3. Section 1.5.8.1 The total area of wetlands to be impacted is not clear since the applicant has claimed in meetings, that no adverse impacts to any wetlands will occur. The area of postmining habitat listed is in conflict with other sections of the statement dealing with the subject.

4. Section 1.5.8.2 Wildlife resources will be adversely impacted and will not be restored or enhanced by the reclamation plan. We strongly recommend the use of Habitat Evaluation Procedure or some similar evaluation methodology to assess the impact to fish and wildlife resources and developing an adequate mitigation plan.

5. Section 4.4.5.1. The applicant has not demonstrated the ability to restore areas of unusually high wildlife resource value such as pine/hardwood forest, bottomland hardwood forest, riparian habitat and wetland habitat. We recommend that the applicant be required to demonstrate this ability prior to mining large tracts of these habitats. The primary and secondary use should be stated for each postmining impoundment.

6. Table 4.4 contains a list of tree and woody species for commercial forest. This list is misleading since on some commercial forest areas only pine trees will be planted. Sweetgum and cottonwood trees should be replaced with mast producing species.

7. Section 5.5.3.4. Adverse impacts, short and long term, to mined streams and their aquatic communities will result from the proposed action. Restoration of these habitats and streams should be required.

RESPONSE TO COMMENTS

FROM:
Department of Wildlife and Fisheries
Post Office Box 15570
Baton Rouge, Louisiana 70895

18 March 1983

Comment	Response
(1)	The conveyor system is elevated which will allow small and medium sized animals to cross under the conveyor; roads and transfer points will provide crossings; a dust cover and dust suppressant will be utilized; and the belt will be flipped on return to the mine to minimize loss of lignite particles. The conveyor system will comply with LOCSMD regulations (See Appendix C). DHMV, LOCSMD, and LDWF are continuing coordination efforts on the conveyor system, including considerations for design and placement.
(2)	In addition to Section 1.3, levees are discussed in Section 4.4.4.6 of the SDEIS. Levees will be temporary structures employed at specific locations, principally near Buffalo, Mundy, and San Patricio bayous in the west area and near West Branch, Dolet, Prairie, and Louies bayous in the east area, to protect the open mining pits on an as-needed basis. The location and design of these structures will be determined as mining progresses through the mine site. The potential for increasing surface water elevations lateral to and above the open mine pit by employing levees is recognized and will be considered in their final location and design.
(3)	Mining operations will not occur in the USCE-delineated wetlands. The SFEIS has been revised to reflect this comment. See pages III-36 and III-41 of this document.
(4)	An assessment of the quality of wildlife habitat to be affected by the proposed project is summarized as revisions to the SDEIS on pages III-38 through III-40 of this document, and the complete report is included as Appendix D.
(5)	LOCSMD regulations requiring demonstration of reclamation techniques are presented in Appendix C of this document. DHMV must comply with these regulations.
(6)	Concur. Only pine trees will be planted in commercial forest areas according to lease agreements. Table 4-4 has been modified to reflect this comment by removing references to commercial forestry species and woody species mixture for forest areas (see pages III-17 and III-18 of this document).
(7)	Restoration of aquatic habitats, including meanders and riffle areas is subject to LOCSMD regulations. See Appendix C of this document. DHMV must comply with these regulations.

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160

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18 MAR 1983

IN REPLY REFER TO:

Planning Division
Environmental Analysis Branch

SUBJECT: Comments on Dolet Hills Lignite Mine Project, DeSoto Parish, LA (A Supplement to the Dolet Hills Power Plant EIS)

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency
Region 6
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

1. A total of 15,466 acres directly affected by mining operations in addition to other adverse impacts (roads, facilities, etc.), out of a total permit area of 29,573 acres, represents a serious loss to wildlife species. We agree with your statement on page 5-97 that, "Due to the large area involved, the operation of the Dolet Hills Lignite Mine will result in a major adverse long-term impact on the wildlife resources of the area." However, measures to mitigate these losses, as stated in Table 1-1, are unclear. Mitigation certainly appears to be inadequate based on ". . . creation of fish and wildlife habitat and development of water resources representing approximately 2% of the postmining land use in the permit area." Wildlife losses in the form of a habitat-based or monetary-based analysis need to be provided as well as your plan for mitigating those losses. This analysis could be provided as an appendix to a revised draft or to the final report.

2. Section 5.9.4.1, which deals with acid rain, underestimates the significance of this problem and the principle role that electric-generating facilities might play in its creation. Moreover, the sections dealing with impacts of operation on potentially-affected resources do not even mention acid precipitation. These resource sections should be expanded to address potential acid rain problems. Buffering capacity of soils downwind of the plant site should be discussed. It might be beneficial to discuss the difference, if any, between the emissions of lignite vs. other coal-burning facilities and how this may increase or decrease acidity of precipitation.

3. You should contact the New Orleans District Corps of Engineers by separate letter providing more detailed information about specific drainage problems relating to operation of the mine because it might be impacted by existing or proposed Corps projects. If you have any questions regarding this matter, please contact Mr. Dave Reece at (504) 838-2522.

Sincerely,

Robert C. Lee
Colonel, Corps of Engineers
District Engineer

RESPONSE TO COMMENTS

FROM: Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70180

18 March 1983

Comment	Response
(1)	The SDEIS has been revised to provide an assessment of the quality of wildlife habitat to be affected by the proposed project. See pages III-38 through III-40 of this document and Appendix D. DHMV's proposed measures to mitigate losses have been compiled into a separate presentation. See pages III-14 through III-16 of this document.
(2)	The term "acid rain" (or, more correctly, "acid deposition") encompasses a variety of complex processes whereby acidic substances enter the terrestrial and aquatic environments via the atmosphere. Acid deposition is a multifaceted issue with significant scientific, political, and economic aspects. Because of its complexity, multifaceted character, and importance to both the environment and the economy, acid deposition has become a major public controversy. In the most thoroughly investigated area of the country, the Northeast, it has been alleged that acid deposition is damaging lakes, vegetation, and soils. It has also been alleged that the acid deposition is caused primarily by power plant emissions and that the problem is getting worse. A large body of evidence exists which tends to support these allegations. At the same time, however, there is also a substantial amount of evidence which contradicts these allegations. For example, the U.S. Geological Survey has found that there has been almost no change in precipitation chemistry in New York state during the last two decades. No trend in precipitation chemistry has been observed at the longest, continuously operated acid precipitation monitoring site in the country (at Hubbard Brook Experimental Forest, New Hampshire) as well as other sites. Major gaps remain in the understanding of acid deposition. Acid rain deposition effects on the environment are the subject of many large on-going studies that directly involve EPA. Some of them show predicted changes in pH and location of acid precipitation. Also, some promising abatement technology is being explored that may reduce potential adverse impacts. Recognizing that acid rain formation is a subject of nationwide concern, there is still widespread study and discussion on how to accurately assess cumulative effects of coal development in on this aspect of air quality. As future projects are developed, more accurate and extensive monitoring is

RESPONSE TO COMMENTS

FROM:

Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70180

18 March 1983

Comment	Response
(2) (Concluded)	accomplished, and other studies are complete, a more definite assessment may be made on acid rain formation and impact.
(3)	EPA contacted the New Orleans District concerning existing or proposed USCE projects. The closest USCE project is the Red River Waterway Project, which is a planned system of locks and dams to be located on the Red River between Alexandria and Shreveport, Louisiana. The purposes of the project are navigation, bank stabilization, and recreation. Locks 1 and 2 are already under construction. Locks 3, 4, and 5, to be located in Natchitoches, Red River, and Caddo parishes, respectively, are dependent on future funding. While it is not anticipated that this project will significantly affect water levels in the proposed mine area, future contact for coordination will be with the Vicksburg District Corps of Engineers.

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STATE OF LOUISIANA
DEPARTMENT OF CULTURE, RECREATION AND TOURISM
OFFICE OF PROGRAM DEVELOPMENT

DAVID C. TREEN
Governor

ROBERT B. DeBLIEUX
Assistant Secretary

MRS. LAWRENCE H. FOX
Secretary

March 17, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
EPA Region 6
1201 Elm Street
Dallas, Texas 75270

Re: Supplemental Draft EIS
Dolet Hills Lignite Mine Project
DeSoto Parish, Louisiana

Dear Mr. Spotts:

The referenced Environmental Impact Statment has been reviewed, and we have these comments to offer.

1. On page 1-15 of the Summary Chapter it is stated that "No known cultural resource sites within the surveyed portion are listed on the National Register of Historic Places. One historic standing structure is considered eligible for nomination to the National Register of Historic Places by the surveying archaeologists and has been recommended for further work." Please note that the structure in question, the Glassell-Turner House, (16DS153), has been approved by the State Review Committee, and its nomination to the National Register of Historic Places is presently pending in Washington, D.C. The sentence following states that "Four additional sites are recommended for further work to determine their potential eligibility to the National Register of Historic Places. "Sites" in this sentence should be changed to "standing structures."

2. We have several comments to make concerning the cultural resources section in the body of the report. In subsection 5.6.3., the third paragraph should be revised to include the comment above on the Gassell-Turner House (16DS153). Note also that additional work has been recommended for four additional standing structures (16DS144, 16DS145, 16DS162 and 16DS164), rather than three as is stated. No further work has been recommended for the cemetery (16DS154) mentioned in this paragraph. The fourth and eigth paragraphs in subsection 5.6.3. also need to be revised to reflect these comments.

3. In subsection 5.6.5., note that site 16DS154 (Grove Hill Church and Cemetery) is not one of the cultural resources identified to date in the mining permit area that is considered to be potentially eligible for inclusion in the National Register of Historic Places. Reference to this site should therefore be deleted.

DIVISION OF ARCHAEOLOGY

4. In subsection 5.6.6., reference to 16DS154 should be deleted in accordance with the above comments and a discussion inserted on 16DS162, which has been determined to be potentially eligible for inclusion in the National Register of Historic Places.

5. Finally, in subsection 5.6.7., in the discussion of the Louis Procello site (16DS212), note that both a draft and final report of the data recovery program that was carried out at the site have been submitted to our office for review. Lastly, the final two sentences should be revised to reflect the comments made above.

Should you have any questions regarding our comments, do not hesitate to contact my staff in the Division of Archaeology.

Sincerely,

RBDeBl

Robert B. DeBlieux
State Historic Preservation Officer

RBD:PGR:tb

RESPONSE TO COMMENTS

FROM:

Department of Culture, Recreation and Tourism
Office of Program Development
Division of Archaeology
P.O. Box 44247
Baton Rouge, Louisiana 70804

17 March 1983

Comment	Response
(1) - (5)	Comment acknowledged. The SDEIS has been revised to reflect the comments. See pages III-44 through III-47 of this document.

Federal Emergency Management Agency
Region VI Federal Center Denton, Texas 76201

March 25, 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
U. S. Environmental
Protection Agency
Region 6 (ES-F)
1201 Elm Street, Suite 2800
Dallas, Texas 75270

Dear Mr. Spotts:

This will acknowledge receipt of the Supplemental Draft Environmental Impact Statement (EIS) for Dolet Hills Lignite Mine Project located in Desoto Parish, Louisiana.

We have completed a review of the Draft EIS and have no further comments to offer at this time.

Thank you for submitting this document for our review.

Sincerely,

R. Dell Greer, Chief
Natural & Technological
Hazards Division

Enclosure

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MAR 30
6 ES

RESPONSE TO COMMENTS

FROM:

Federal Emergency Management Agency
Region VI
Federal Center
Denton, Texas 76201

25 March 1983

Comment	Response
General	No response necessary.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Project Review
Post Office Box 2088
ALBUQUERQUE, NEW MEXICO 87103

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MAR 29 1983

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency
Region 6 (ES-F)
1201 Elm Street, Suite 2800
Dallas, Texas 75270

Dear Mr. Spotts:

We have reviewed the supplemental draft environmental impact statement (EIS) for the Dolet Hills Lignite Mine Project, De Soto Parish, Louisiana and offer the following comments.

We note that the project involves the construction and operation of a 29,573-acre surface lignite mine. The State of Louisiana has assumed primary responsibility under the Surface Mining Control and Reclamation Act of 1977 for regulating surface mining in Louisiana. A permit to mine must be obtained from the State prior to commencement of mining activity. However, the Office of Surface Mining still maintains an oversight role in assuring that coal mining in Louisiana complies with that Act.

The Department is concerned about the project-related loss of valuable bottomland hardwood, riparian, hydric (marsh and swamp) and aquatic habitats, and the conversion of large areas of upland pine-hardwood forest to commercial pine monoculture.

1. Although the long term adverse impacts to fish and wildlife resources and their habitats are adequately described in the draft EIS, the document lacks an evaluation of reasonable alternatives that could lessen those impacts, or mitigation measures necessary to offset or compensate for the losses to be incurred.

The bottomland hardwood forests, and riparian, hydric and aquatic habitats within the permit area are habitats of unusually high value for fish and wildlife. These habitats, which support many species of high federal interest, are relatively scarce or becoming scarce on a national and ecoregion basis.

2. Thousands of acres of this high value habitat will be lost with apparently little or no consideration given to wildlife, since there is no indication in the draft EIS that mitigation measures and/or fish and wildlife plans have been formulated. Such plans should be developed as part of the project and evaluated in the final EIS. The EIS should evaluate the technological

3. feasibility of achieving acceptable on-site habitat reestablishment according to standards for success contained in the Louisiana surface mining regulations. Also, failure to incorporate adequate mitigation features into the project plans may be contrary to those Louisiana surface mining requirements for the protection and reestablishment of high value habitats.

   For further technical assistance on planning of fish and wildlife mitigation and management, please contact Ronald Haines, Coal Coordinator, U.S. Fish and Wildlife Service, Richard B. Russell Federal Building, 75 Spring Street S.W., Atlanta, Georgia 30303-3376 (FTS 242-6379).

4. In summary we believe the statement will be inadequate until it fully describes alternative methods for minimizing impacts to fish and wildlife resources or mitigation measures necessary to compensate for the losses that will occur.

   Additional detailed comments and recommendations concerning this issue are provided for your consideration in Attachment A.

Sincerely,

Raymond P. Churan

Raymond P. Churan
Regional Environmental Officer

Attachment

ATTACHMENT A

Specific Comments

5. Sections 1.5.8.3 and 5.5.3.4 - In these sections the draft EIS adequately describes the long term adverse impacts that permanent and temporary diversions will have on fish and wildlife resources. The final EIS should contain a discussion of mitigation and enhancement techniques that will minimize or offset these adverse impacts.

6. Section 4.3.6 - The reclamation procedures described in this section make no provisions for the restoration of valuable fish and wildlife habitat. This section should be expanded to describe a habitat restoration or enhancement plan and include an analysis of the measures necessary to mitigate for unavoidable impacts. These comments also apply to sections 4.4.5.1 and 5.5.1.4 of this document.

7. Section 5.2.1.1 and 5.2.1.4 - The specific yield values and storage coefficients determined in the aquifer test mentioned on page 5-27 should be included in the final EIS to permit better evaluation of the effects of mine dewatering on the surrounding area. For this same purpose, the effects of leakage from the Naborton formation should be more thoroughly evaluated and the anticipated pumping rates for dewatering operations should be discussed. In addition, the analysis should include a discussion of mitigation for destroyed or impaired wells in the area surrounding the mine.

8. Sections 5.5.1.3 and 5.5.1.4 - These sections should clearly describe the location and extent of wetlands to be mined or otherwise disturbed, and discuss the adverse impacts both direct and indirect that mining will have on these wetlands. Also, the draft statement lacks an assessment of the compliance of the alternative actions with Section 404 of the Clean Water Act and Executive Order 11990 on wetlands protection.

9. Section 5.5.2.4 - This section should be expanded to analyze and discuss a reclamation alternative which would provide for a diverse vegetative cover in addition to the proposal for the establishment of pure pine monoculture.

10. Section 5.6.4 - The retrival of information from cultural and historical sites to be disturbed or destroyed is considered mitigation of those adverse effects. Undiscovered or undisturbed sites do not constitute a loss as described in this section. Undisturbed sites, preserved in their original state, remain viable archeological resources for future generations to discover and evaluate. This should be recognized in the draft EIS.

11. Section 5.9.2 - Local lowering of ground water levels resulting from mine dewatering may effect base flow of Dolet Bayou. Any cumulative effect from the combined dewatering activities of the Dolet Hills Mine and nearby Oxbow Mine should be discussed.

Appendix D - We are pleased to note that the U.S. Environmental Protection Agency is formulating a Memorandum of Agreement (MOA) concerning treatment of cultural resources in the project impact area. As information concerning the MOA and planned cultural resource surveys is developed, the following offices of the National Park Service should be advised and given an opportunity to comment: Division of Environmental Coordination, Southwest Region, Post Office Box 728, Santa Fe, New Mexico 87501, and the National Register Division, Southeast Region, 75 Spring Street S.W., Atlanta, Georgia 30303-3376, Attention: Mr. Paul Hartwig.

12. The Proposal for Agreement contained in Appendix D refers to the National Architectural and Engineering Record (page D-3). The address given is incorrect and should be changed to: National Park Service, Southeast Region, National Register Division, 75 Spring Street S.W., Atlanta, Georgia 30303-3376, Attention: Mr. Paul Hartwig.

Recommendations

With regard to the above-listed concerns and issues, the U.S. Fish and Wildlife Service, as a Cooperating Agency for this proposed project, offers the following recommendations:

13. 1. For those cases where mining in any streams and their associated riparian or buffer zones, hillside seepage bogs, Corps of Engineers-jurisdictional wetlands and bottomland hardwood forests is approved by the Louisiana Office of Conservation, the operator should be requested to make a binding commitment to re-establish those habitats following mining, and to fully compensate for unavoidable losses of valuable wildlife habitat.

14. 2. The proposed mine operation should be reevaluated for the exclusion from mining of the above-referenced sensitive habitats where proven reestablishment techniques are not feasible. Efforts should also be made to avoid alteration of the hydrologic regime responsible for the maintenance of those habitats.

15. 3. In order to provide quantitative habitat evaluation data for use in the development of an objective mitigation and reclamation plan, we recommend the carrying out of a habitat evaluation assessment for selected habitats such as the bottomland forest type. The FWS-developed Habitat Evaluation Procedure (HEP) or any other acceptable habitat evaluation system which quantifies habitat value for selected species would suffice. However, the FWS considers the HEP to be a state-of-the-art approach, and their personnel could assist in carrying out the HEP.

16. 4. The operation should be required to implement and evaluate demonstration studies for reestablishment of those sensitive habitat types. The period of evaluation for such studies should be at least 5 years and preferably 10 years. To achieve this goal, the applicant should consider altering the proposed mining sequence to mine in the upland pine-hardwood forest portions before proceeding toward wetland and bottomland forest areas. This action may provide the applicant with sufficient time to demonstrate successful ability to reestablish sensitive habitat types subsequent to mining.

17. 5. The operator is encouraged to develop additional vegetation diversity on reclaimed pine plantations. This can be achieved by breaking up any proposed large, contiguous blocks of commercial pine with selected hardwood plantings.

18. 6. The alternative of no effluent discharge (with specifically defined exceptions as needed), should be carefully considered.

RESPONSE TO COMMENTS

FROM:

United States Department of the Interior
Office of the Secretary
Office of Environmental Project Review
P. O. Box 2088
Albuquerque, New Mexico 87103

29 March 1983

Comment	Response
(1a)	A list of additional alternatives for minimizing impacts to fish and wildlife resources and alternative mitigative measures, including certain methods to offset fish and wildlife losses, is included as a revision to the SDEIS. See pages III-5 and III-14 through III-16 of this document.
(1b)	An assessment of the quality of wildlife habitat to be affected by the proposed project is summarized on pages III-38 through III-40, and the complete report is included as Appendix D.
(2)	Mitigation measures, including those to offset fish and wildlife losses, are included as a revision to the SDEIS. See pages III-14 through III-16 of this document. DHMV must comply with LOCSMD regulations relating to the development of a fish and wildlife plan. See Appendix C of the SFEIS.
(3)	Concur. The portions of the LOCSMD regulations that relate to mitigation of fish and wildlife resources (e.g., protection and reestablishment of "high value habitats") have been included as Appendix C of the SFEIS. DHMV must comply with these LOCSMD regulations. Field test plot studies are presently being conducted on-site to demonstrate the feasibility of achieving wildlife habitat reestablishment according to LOCSMD standards.
(4)	Concur. The alternative methods for minimizing impacts to fish and wildlife resources and the mitigation measures to compensate for losses are included as revisions to the SDEIS. See pages III-5 and III-14 through III-16 of this document.
(5) & (6)	The SDEIS has been revised to incorporate additional mitigation and habitat restoration measures. See pages III-14 through III-16 and III-42 of this document.
(7)	Pumping tests during initial ground-water baseline studies were not conducted for a time duration sufficient for dissipation of delayed drainage or gravity drainage effects under unconfined conditions; therefore, storage coefficients and leakage factors for the unconfined condition cannot be presently calculated. Storage coefficients were, however, determined for two tests within the Naborton. Values obtained were 0.00015 and 0.00013 (0.00014 average), but leakage factors cannot be reliably determined from this data. In order to

RESPONSE TO COMMENTS

FROM:

United States Department of the Interior
Office of the Secretary
Office of Environmental Project Review
P. O. Box 2088
Albuquerque, New Mexico 87103

29 March 1983

Comment	Response
(7) (Concluded)	finalize the design of the mine plan, DHMV plans perform additional studies which will initially focus on the first 5-year mining area. Wells within this area will be selectively placed and pumping tests will be performed in order to specifically define such operating parameters as pumping rates for dewatering during mining. As discussed in Section 5.2.1.4 of the SDEIS, existing wells within one-half mile of mining dewatering and/or depressurizing will be adversely impacted when considering "worst case" conditions (i.e., maximum depth of mining and a homogeneous water bearing strata with the highest permeability determined for the permit area). Outside of this one-half mile area, adverse impacts to the productivity of ground-water wells is expected to be minimal. If the radius of influence of two or more mines were to overlap, one possible outcome would be that ground-water drawdowns in the overlap area would be greater than one would expect from a single project separately; therefore, a cumulation of impacts to ground water would result. The permitted Oxbow Mine is located approximately 4 kilometers (2.5 miles) east of the Dolet Hills Project's eastern boundary. There exist several alternative sources of water to users in the area. DHMV will replace affected supplies with suitable alternative sources in accordance with LOCSMD regulations.
(8)	Wetlands will not be mined and therefore, not directly impacted. See revisions to SDEIS contained in Part III of this document pages III-36 and III-41 The wetlands within the surface mining permit area are covered under a nationwide permit. The USCE has requested that DHMV contact its office prior to mining in the vicinity of wetlands to determine if the nationwide permit is still in effect (see letter from USCE to DHMV in Part II, Section B). The intent of Executive Order 11990 has been exemplified by DHMV's decision not to mine lignite under the Chemard Lake wetlands, which were included in their original plans.
(9)	See response to comment (1a).
(10)	Concur. Paragraph 5.6.4 of the SDEIS has been revised. See page III-45 of this document.
(11)	The SDEIS has been revised to reflect this comment. See pages III-51 and III-52 of this document.

RESPONSE TO COMMENTS

FROM:

United States Department of the Interior
Office of the Secretary
Office of Environmental Project Review
P. O. Box 2088
Albuquerque, New Mexico

29 March 1983

Comment	Response
(12)	The new addresses have been added to the MOA which is presented in this document as Appendix B.
(13) & (14)	DHMV must comply with LOCSMD regulations. LOCSMD regulations pertaining to reclamation requirements for wildlife habitat, hydrologic balance, and bond requirements are presented in Appendix C.
(15)	An assessment of the quality of wildlife habitats to be affected by the proposed project is presented on pages III-38 through III-40 of this document.
(16)	See response to comments (13) and (14).
(17)	The predominant landowner preference for postmining land use of leased land in the mine permit area is pine plantation or pasture grasses only. Recognizing, however, that wishes of future landowners concerning revegetation requirements may change, LOCSMD will require that DHMV reassess the landowners' wishes periodically during the course of mining. Also, it may be possible for DHMV, through current owner consent, to intersperse and interplant fish and wildlife vegetation within the pine areas (see letter on page II-53). The applicant will utilize fish and wildlife habitat as the primary postmining land use for fee land that will be mined within the mine permit area. The total fee land that is owned exclusively by SWEPCO/CLECO without obligation is approximately 203 hectares (500 acres). This land is distributed rather evenly in 4.0-32.4 hectare (10-80 acre) tracts in the eastern and western portions of the area to be mined. Both fee lands and riparian habitat sites associated with permanent sedimentation ponds, re-routed streams, etc. will be reclaimed to fish and wildlife habitat as required by LOCSMD regulations. These fish and wildlife habitat sites are scattered throughout the permit area.
(18)	The alternative of "no effluent discharge" was considered. The nature of project mining operations (e.g., dewatering of overburden prior to mining, sedimentation pond requirements to control surface water from disturbed areas, etc.) coupled wth the magnitude of area to be affected by the project precluded "no effluent discharge" as a feasible alternative.

Wildlife Management Institute

709 Wire Building, 1000 Vermont Ave., N.W., Washington, D.C. 20005 • 202 / 347-1774

DANIEL A. POOLE
President
L. R. JAHN
Vice-President
L. L. WILLIAMSON
Secretary
JACK S. PARKER
Board Chairman

PLEASE REPLY TO:
Murray T. Walton
Southcentral Representative
Star Route 1A, Box 30G
Dripping Springs, Texas 78620
512-825-3473

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April 7, 1983

Mr. Dick Whittington, Regional Director
U.S. Environmental Protection Agency
1201 Elm Street, Suite 2800
Dallas, Texas 75270

Dear Mr. Whittington:

The Wildlife Management Institute has reviewed the Supplemental Draft
Environmental Impact Statement, Dolet Hills Lignite Mine Project, DeSoto Parish,
Louisiana. The proposed action will disrupt approximately 30,000 acres and
1. over 16 miles of streams. Planned reclamation indicates fish and wildlife
habitat will be seriously degraded even after restoration of the area. Wildlife
measures appear to be given low priority and may not be accomplished at all
due to lease agreements (page 5-87). Furthermore, we are aware of considerable
irregularities and failures in earlier project planning (attached letter dated
2. March 17, 1983 from Jesse J. Guidry to Patrick h. Martin is included as part
of our comments).

The Institute recommends that a new mining plan be developed to minimize
3. disturbances to riparian areas. Also, it is recommended that all forest areas
be reclaimed with a mixture of native species, not just pines.

Thank you for the opportunity to comment on this document.

Sincerely yours,

Murray T. Walton

Murray T. Walton
Southcentral Representative

Attachment

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
POST OFFICE BOX 15570
BATON ROUGE, LA. 70895

JESSE J. GUIDRY
SECRETARY
(504) 925-3617

DAVID C. TREEN
GOVERNOR

(504) 342-9245
March 17, 1983

Mr. Patrick H. Martin, Commissioner
Office of Conservation
P. O. Box 44275
Baton Rouge, Louisiana 70804

Attention: Mr. Jim Welsh

Re: Dolet Hills Lignite Project
Dolet Hills Mining Venture
LSM-3

Dear Mr. Martin:

Personnel of the Louisiana Department of Wildlife and Fisheries have reviewed the above referenced application and offer the following general comments with detailed comments attached.

This agency finds the application to be incomplete and inadequate in that it fails to meet the regulations. The application should therefore be returned to the applicant and/or provision placed within the permit to correct all deficiencies. We submit that substantial changes in the proposal are needed and those changes should be made expeditiously.

The project as described will result in significant adverse impacts to fish and wildlife resources. These resources will neither be restored nor enhanced by the proposal. Therefore the application must be amended to meet or exceed the requirements of the state regulations before this agency can issue a letter of concurrence or no objection to the proposal.

We recommend that the applicant be required to demonstrate the ability to successfully reclaim areas of high value for fish and wildlife resources prior to receiving a permit to mine extensive areas of high habitat value.

The application contains information and/or data that are misleading and vague and must be clarified.

At this time a supplemental draft environmental impact statement (SDEIS) for this proposed project has been released by the Environmental Protection Agency for public review and comment. This agency agrees with the SDEIS conclusions that adverse impacts to fish and wildlife resources will occur as a

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result of the proposed action and that those adverse impacts will not be mitigated if the current plan of action is implemented. There are many differences between the SDEIS and the application, however these differences must be reconciled.

These comments are submitted under the state regulations and under the support agreement between the Office of Conservation and this agency.

Sincerely,

Jesse J. Guidry
FBF

Jesse J. Guidry
Secretary

JJG/FOD/fsb

cc: Dr. T. B. Ford
Mr. Ron Samuel
Mr. David Ray Williamson

Dolet Hills Lignite Project
Surface Mining Permit Application LSM-3

1. Section 3.7. Ecology. Section 179.20(c) of the Surface Mining Regulations (SMR) requires that the Office of Conservation (Office) of the Louisiana Department of Natural Resources (DNR) consult with and obtain written guidance from the Louisiana Department of Wildlife and Fisheries (DWF) concerning the determination of level of detail and the area of study of fish and wildlife resources and their habitat. At no time did the Office consult with or obtain written guidance from DWF prior to accepting the application for the Dolet Hills Lignite Project. DWF's letter of November 4, 1982 set forth a requirement that information be generated through the use of the Habitat Evaluation Procedures (HEP). This information is necessary in order to adequately address and evaluate the fish and wildlife resources and the value of the habitat being impacted by the proposed action. During a meeting on November 19, 1982 between the applicant, the Office and DWF, we requested that a HEP be conducted. Neither the Office nor the applicant agreed with this request. Furthermore, the Office's letter of January 25, 1983 submitted the "Baseline Ecology Report Dolet Hills Project" as the "state of the art". If DWF had been consulted during the early planning discussions with the Office, we would have recommended the "current state of the art" and "best technology currently available". The best technology currently available for evaluating fish, wildlife and habitat values currently in use in this state and throughout the U. S. is HEP, Habitat Evaluation Systems (HES) or some similar evaluation system which measures the non-monetary values of fish and wildlife resources and their habitat.

The baseline report was mainly developed as a support document for obtaining permits which could be required from the Corps of Engineers and the U. S. Environmental Protection Agency. During a meeting on December 12, 1982 between the Office and DWF, it was determined that the applicant had held several meetings with the Office. One of these meetings was held on September 23, 1979 to discuss the wildlife baseline study. The sampling period for this study and report was from May 1979 through May 1980. Therefore, five months of study had apparently taken place prior to the discussion between the applicant and the Office concerning requirements, area of study or level of detail. The Office did not have full approval from Office of Surface Mining, Reclamation and Enforcement (OSM) of the U. S. Department of the Interior until October 10, 1980. DWF was not consulted prior to nor after this date concerning Section 179.20(c).

On May 18, 1981 the Office provided the applicant with a copy of "A Handbook for Meeting Fish & Wildlife Information Needs to Surface Mine Coal" (Handbook) which was jointly produced by OSM and the Fish and Wildlife Service of the U. S. Department of the Interior. The Handbook provides applicants with suggestions for developing information and data required under Section 179.20 and recommends the use of HEP or similar methods. It very strongly points out the importance of contacting fish and wildlife agencies in making fish and wildlife value determinations.

Failure to consult with DWF resulted in incomplete and inadequate assessments of fish and wildlife resources and the assessment does not meet the requirements of Section 179.20. Discussions of habitats of unusually high value for fish and wildlife are incomplete and inadequate and do not conform to Section 180.16. Habitats of unusually high value are pine/hardwood, bottomland hardwood, riparian habitat and all types of wetlands.

In order to meet the regulations, we strongly recommend that the following provisions be placed within the proposed permit.

A. The applicant shall conduct and complete a HEP or a similar evaluation method on the permitted project with coordination with both state and federal fish and wildlife agencies within one year of issuance of the surface mine permit.

B. The applicant shall develop and complete a mitigation plan with approval by state and federal fish and wildlife agencies within one year of issuance of the surface mine permit.

C. The mitigation plan when approved shall become a part of the surface mine permit.

2. Section 4.1.4. Lignite Transportation. The description given of the conveyor system is not consistent with Section 180.37. Cross sections and detailed descriptions of the system are not provided. The application states that animal crossings will be provided at locations determined in consultation with DWF. However meetings with the applicant on November 19, 1982 and January 21, 1983 did not result in an agreement or a commitment to any animal crossings by the applicant. Revised Drawing 1010 contains crossings of roads and animal crossings at transfer points but lacks animal crossings along the route between transfer points. Road crossings are not to be classed as animal crossings. DWF has developed a general policy in reference to animal crossings and conveyors. This policy was related to the Office and all known mining companies planning to operate in this state in a letter dated January 7, 1983. A detailed review of the conveyor route will be required to determine the locations of these crossings. The applicant has stated that detailed route information will not be available until this summer. However DWF will require animal crossings for this project in accordance with Section 216.180(a)(1).

In order to meet the regulations, this agency strongly recommends that the following provisions be placed within the proposed permit.

A. The applicant shall provide the amount of animal crossings along the conveyor route at the locations determined by DWF.

B. The applicant shall provide detailed cross sections and profile sections of the conveyor at each animal crossing to DWF for review and approval prior to construction.

C. The applicant shall have animal crossings with a minimal vertical clearance of 10 feet and 100 feet horizon clearance located in low areas, valleys or watercourses.

D. The applicant shall also provide animal crossings at all transfer points along the conveyor route.

The proposed project does not appear to provide for adequate protection of water quality and aquatic environments along the conveyor route. Regulations require protection of water quality and/or quantity from pollutants leaving areas disturbed by mining activities. DWF notes that the return portion of the conveyor belt will be upside down against idlers or bogies. Pollution from coal particles dropped from the conveyor will occur. DWF suggests the use of "best technology currently available" (Sections 216.41, 216.42 and 216.180). The flipping of the return portion of the belt has been purported to us to be of the best technology currently available. If this method is used, the surface of the belt in contact with the coal will always be facing up resulting in a significant reduction of pollution, adverse impact to aquatic communities and possible need of sedimentation ponds.

3. Section 4.1.6. Water and Air Pollution Control. This section does not appear to adequately address water pollution control in accord with Section 180.11 (b)(6) and 180.14(b)(9). The flipping of the conveyor belt and the addition of sedimentation ponds is suggested.

   In order to meet the regulations, this agency strongly recommends that the following provision be placed within the proposed permit.

   A. The applicant shall establish surface water monitoring stations at downstream locations on each of the streams crossed by the conveyor.

4. Section 4.6. Fish and Wildlife Plan. The proposed plan will not enhance the fish and wildlife resources of the impacted area and is not consistent with Sections 180.16(a)(1) and 179.20(c). In fact the overall impact will be adverse and restoration and recovery of fish and wildlife values will not occur. The plan has been determined to be inadequate by this agency (Section 186.17(a)(2).

   The coordination of any plan with a fish and wildlife agency should begin during early planning stages to avoid major modifications to a plan that does not achieve enhancement as required where practicable under Section 180.16(a)(1) and does not protect and enhance species and their habitat as discussed under Section 180.16(b)(2)(3). The features of the proposed fish and wildlife plan are reviewed in the following items.

   The application indicates that minimal wetland acreage will be impacted by mining operations while the applicant and his consultants have stated in meetings that no impacts to wetlands are to occur. This apparent conflict needs to be resolved to insure consistency with the regulations (Section 216.97(d)(10).

   In order to meet the regulations, this agency strongly recommends that the following provisions be placed within the proposed permit.

   A. The applicant shall not adversely impact the wetlands from any mining activities and/or disturbed areas where sheetflow or discharges may occur.

B. The applicant shall maintain a one hundred foot (100 foot) buffer zone along all areas of unusually high value for fish and wildlife including wetlands unless these areas are specifically authorized for mining by the Office.

5. Section 5.1.2. Reclamation. The application indicates that there will be land use changes which we believe to be inconsistent with Sections 180.23 (a)(3) and 216.133(c)(8), which states in part "necessary approval of measures to prevent or mitigate adverse effects on fish, wildlife and related environmental values ... is obtained from the Office and appropriate state and federal fish and wildlife agencies ... before surface mining activities begin." DWF notes that such approval and review is to take place before the mining activities begin in order to prevent gross misplanning, long term adverse impacts, and inconsistency with the regulations.

6. Section 5.1.2.1. Forestry. In reviews and discussions with the applicant, it has become apparent that the second paragraph of this section refers to floral species selected for fish and wildlife habitat under Section 5.1.2.3. This can be seen by the description of forest acreage to receive the one acre wildlife areas per 20-25 acres of pine forest which are the same forest to have a secondary use of wildlife habitat. Section 5.1.2.1. should be revised to reflect the actual amount of forest to receive pine trees only and pine forest with the one acre wildlife areas. All changes should be reflected on Drawing 1020 and Table 5.1-1.

   The first paragraph of this section states that "Areas reclaimed to forest will have ... a secondary use of wildlife habitat." However section 5.1.2. states that "... fish and wildlife habitat areas will be created ... throughout forest that are not required by lease to be commercial pine forest." These two statements are not compatible when reviewing Section 216.97(d)(9). This regulation is clear as to the use of flora which maximize benefits to fish and wildlife and specifies that any area of secondary wildlife use must also be enhanced.

7. Section 5.1.2.3. Fish and Wildlife Habitat. The establishment of fish and wildlife habitat along permanent diversions and restored stream channels as presented in the application is inadequate and is not consistent with Sections 216.44 and 216.57.

   Section 216.57(a) provides for a 100 foot buffer along perennial streams and streams defined by Section 216.57(c). It also protects these streams from mining unless the Office specifically authorizes surface mining activities closer to or through them. However if these streams are mined, they must be restored to their original channel according to Sections 216.57(a)(1) and 216.44(d). Aquatic habitats are to be restored under Section 216.44(d)(3) such as ripples, pools and drops, which includes a waterfall and pool occurring in the mine area. Streams are proposed for restoration in lowland areas only. Therefore we contend that inadequate restoration and enhancement is proposed and we aver that the proposal does not meet the requirements of the above sections nor of Section 216.97(a)(d)(4)(5)(6).

   Section 216.97(a) requires the use of best technology currently available to minimize disturbances and adverse impacts ... on fish, wildlife and related environmental values. Section 216.97(d)(4) requires restoration, enhancement where practicable, or avoiding disturbance of habitats of unusually high value for fish and wildlife. While Sections 216.44(d)(1) and 216.97(d)(5) requires restoration, enhancement where practicable, or maintaining of natural riparian vegetation on the banks of streams. Section 216.97 (d)(6) affords protection to aquatic communities by avoiding stream channels as required in Section 216.44.

In order to meet the regulations, this agency strongly recommends that the following provisions be placed within the proposed permit.

A. The applicant shall provide a detailed survey of each stream as defined by Section 216.57(c) prior to mining. This survey shall include longitudinal profile and cross sections with identification of all waterfalls, riparian habitat, pools, ripples and other aquatic habitat areas.

B. The applicant shall provide a detailed reclamation plan for each stream as defined by Section 216.57(c) prior to mining for approval by LDWF.

C. The applicant shall provide a 100 foot riparian habitat along each stream as defined by Section 216.57(c) unless specifically authorized by the Office for mining. In such case, the applicant shall provide a 100 foot riparian habitat along these streams as a part of the reclamation plan.

The Office is requested to inform this agency of the criteria used to decide if a diversion can be permanent. Section 216.57 requires the specific authorization to mine streams as defined by that section. What is the Office criteria for specific authorization and identification of these mining requests?

8. Section 5.1.2.4. Developed Water Resources. Additional descriptions of fish and wildlife habitat is needed. The width of the habitat around the impoundments must be shown. The application fails to provide cross sections of all of the types of impoundments proposed to be used and therefore does not comply with Sections 180.21(a) and 180.25(a)(1)(ii). The application does not describe postmining use of impoundments as required in Sections 180.25(b)(c) and 216.49(a)(1)(7).

9. Section 5.1.3. Revegetation Species. Tables 5.1-1 and 5.1-2 must be revised to reflect the correct species to be planted as per Section 5.1.2. Sweetgum and cottonwood are to be replaced with mast producing species.

10. Section 5.2.4.1. Diversion of Streams. The application does not contain cross sections of the diversions, thus does not comply with Sections 180.21(a) and 180.29. DWF requested these cross sections in its letter of November 4, 1982 and received them in the meeting of November 19, 1982. However this information should have already been in the application.

There is a conflict between the narrative and the drawings concerning the permanent diversion of Ten Mile Bayou. The permanent impoundment at the lower end of the diversion of Ten Mile Bayou is not discussed in the text.

11. Section 5.3. Postmining Land Uses. The criteria listed are not the only two required by Section 180.23(a)(3). Table 5.3-1 reflects 100 percent of the mine permit area to be reclaimed, while the narrative states only disturbed areas to be reclaimed. Revised Drawing 1020 contains conflicting information. The application should be revised to reflect the actual areas and acreages to be reclaimed. Changes are also needed in other sections as previously stated.

RESPONSE TO COMMENTS

FROM:

Wildlife Management Institute
709 Wire Building
1000 Vermont Avenue, N.W.
Washington, D.C. 20005

7 April 1983

Comment	Response
(1)	Planned reclamation measures are included in Part I of the SFEIS and as revisions to the SDEIS presented on pages III-14 through III-16 and III-42 of this document.
(2) and (3)	For the purposes of this EPA environmental review, assurances of compliance with State Mining Regulations for fish and wildlife concerns are documented in LOCSMD's response to the referenced 17 March 1983 letter. See pages III-52 through III-54 of this document.

RECEIVED
JUN 10 [illegible]
6 ES

State of Louisiana

PATRICK H. MARTIN
COMMISSIONER

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION
SURFACE MINING DIVISION

JAMES H. WELSH
CHIEF OF SURFACE MINING

May 27, 1983

Mr. Clinton B. Spotts
Region 6, E.P.A.
1201 Elm Street
Dallas, Texas 75270

Re: Response to Comments in Letter of March 17, 1983 from Louisiana Department of Wildlife and Fisheries (W.L.&F.) to Louisiana Office of Conservation (LOCSMD)

Dear Mr. Spotts:

Pursuant to your request for our responses to the subject letter, which was attached to a letter of April 7, 1983 from Mr. Murray T. Walton of the Wildlife Management Institute (Southcentral District Office) (W.M.I.) and offered as part of the W.M.I. comments to E.P.A., we are pleased to offer the following response.

First, in our opinion, the W.L.&F. letter does not apply to the subject E.I.S., but rather pertains to the Surface Mining Application filed with the State of Louisiana pursuant to Louisiana Revised Statutes: 30:901, et.seq. (Act) and the Louisiana Surface Mining Regulations, Statewide Order 29-0-1 (Rules) concerning the Dolet Hills Lignite Project, DeSoto Parish, Louisiana (Application No. LSM-3). However, it is our understanding the following information and assurances from LOCSMD are necessary for your Agency to complete the Supplemental Final Impact Statement for the Dolet Hills Lignite Mine. As such, we are offering the following generalized response.

The Louisiana Office of Conservation, Surface Mining Division (LOCSMD) determined the subject Application to be complete on March 1, 1983, and LOCSMD is currently undergoing Application review according to approved procedures. Before Application approval, our Agency is required to make certain findings based upon information contained in the complete Application and subject to adopted Permit Provisions, including, but not limited to:

1. The Application is accurate and complete and that all the requirements of the Act and the Rules issued pursuant to the Act have been complied with, and

2. The Applicant has demonstrated that reclamation as required by the Act and the Rules issued pursuant to the Act can be accomplished under the approved reclamation plan.

POST OFFICE BOX 44275 . BATON ROUGE, LOUISIANA 70804-4275 . PHONE (504) 342-5540

The above Findings will assure environmental protection, including Fish and Wildlife concerns, as well as other areas of environmental concern such as soil, water, and air. Specifically in regard to Fish and Wildlife protection, LOCSMD will not approve the subject Application unless Part 180.16 of the Rules is fully complied with (Fish and Wildlife Plan), and all other pertinent regulations dealing with fish and wildlife habitat protection.

Part 180.16 assures that an appropriate Fish and Wildlife Plan (Plan) shall be developed that meets all of the Fish and Wildlife Performance Standards as contained in Part 216.97 of the Rules. W.L.&F. will be afforded opportunities to comment on the Plan as the Plan is being further developed and before final approval.

LOCSMD will require that this acceptable Plan must be developed and implemented by the Applicant prior to the removal of any overburden during mining operations. The Plan will be included in, and shall become a part of, the approved Surface Mining Application.

It may not be currently practicable to enhance wildlife resources in some areas due to specific prohibitions contained in mining leases requiring the land to be restored to commercial pine forest. Part 180.23(a)(4) of the Rules require that consideration be given to plans of the surface owner in devising a reclamation plan for the mine.

Recognizing, however, that wishes of future landowners concerning revegetation requirements may change, LOCSMD feels it is appropriate that the Applicant be required to reassess the landowners wishes periodically during the course of mining. Also, it may be possible for the Applicant, through current landowner consent, to intersperse and interplant fish and wildlife vegetation within the pine areas. The Plan will include a provision requiring reassessment of landowner wishes concerning establishment of additional wildlife habitat. This additional establishment/enhancement of fish and wildlife habitat will be in addition to the fee lands dedicated to fish and wildlife habitat by the Applicant and described further in the Plan.

The subject Surface Mining Application (LSM-3) has been prepared and submitted to LOCSMD in full compliance with all of our Rules and our Act. Louisiana's Rules and Act have set out guidelines and minimum reclamation standards which must be complied with by the Applicant.

Those persons interested in this Application should be fully aware of LOCSMD's commitment to assure proper reclamation, including fish and wildlife concerns. Before Surface Mining Permit issuance and mining, a performance bond sufficient to assure reclamation must be filed with LOCSMD. This performance bond shall continue for a minimum of five years after all reclamation has been completed. The bond or portions thereof, will be released only if reclamation meets the required standards. Frequent inspections and monitoring of mining operations will be conducted by LOCSMD. In addition, the Permit must be reviewed for adequacy a minimum of every five years, and appropriate Permit revisions may be required.

It is the opinion of LOCSMD that the Applicant's proposed mining and reclamation plan, supplemented by the required Permit Provisions, will assure adequate and timely restoration of all lands affected by the proposed surface mining activities.

Yours very truly,

PATRICK H. MARTIN, COMMISSIONER
Office of Conservation

By James H. Welsh
James H. Welsh, Chief
Surface Mining Division

PHM:JHW:mr

B. OTHER COORDINATION RELATING TO THE PROPOSED PROJECT

Coordination activities with Federal and State agencies and the public since the distribution of the SDEIS in February 1983 are summarized in this Section. Documentation follows each subsection (e.g., all documentation of coordination with Federal agencies appears at the end of Section B,1).

1. Federal Agencies

U.S. Fish and Wildlife Service (FWS) - Section 7 Consultation. EPA requested information from the FWS (Jackson, Mississippi) concerning the presence of threatened or endangered species within the project vicinity. FWS responded that the Red-cockaded Woodpecker may occur in the area and that a Biological Assessment would be required. The assessment of the entire mine area (32 years) was subsequently prepared by EPA and submitted to FWS with a "no effect" determination.

The FWS in Jackson, Mississippi has since reviewed EPA's Biological Assessment and has also concluded that the Red-cockaded Woodpecker would not be impacted by the proposed mining activity as currently planned since there appears to be no suitable habitat within the permit area. The FWS stated that Section 7 of the Endangered Species Act has been fulfilled but that further coordination should be initiated if modifications are made in the project, or if additional information concerning potential impacts to the woodpecker becomes available.

U.S. Army Corps of Engineers (USCE), New Orleans District. Although mining-activities will not directly impact USCE-delineated wetlands, DHMV has consulted with the USCE to determine whether a Section 404 permit would be required for the wetlands in the permit area. The USCE responded that a nationwide permit is authorized at this time under 33 CFR 330.5(a)(21). As regulations are subject to change, the USCE requested that DHMV contact that office about six months before work is initiated around the wetland areas.

U.S. Department of Labor, Mine Safety and Health Administration. DHMV has been assigned its Federal Identification Number.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
JACKSON MALL OFFICE CENTER
300 WOODROW WILSON AVENUE, SUITE 3185
JACKSON, MISSISSIPPI 39213

January 31, 1983

IN REPLY REFER TO:
Log No. 4-3-81-157

Mr. Clinton B. Spotts
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

This refers to your letter of January 10, 1983, transmitting the biological assessment of the impacts of the proposed Dolet Hills lignite mine, De Soto. Parish, Louisiana, on the endangered red-cockaded woodpecker (Picoides borealis).

We have reviewed this document and concur with its conclusions that, since there appears to be no suitable habitat for red-cockadeds within the permit area, this species will not be impacted by the proposed mining activity.

This does not constitute a Biological Opinion, as described under Section 7 of the Endangered Species Act. However, it does fulfill the requirements of the Act; no further endangered species coordination will be required for this project, as currently planned. If modifications are made in the project, or if additional information emerges concerning potential project impacts to listed species, further coordination with our office is requested.

If you require further endangered species assistence on this project, please contact Judy Jacobs of our staff, telephone 601/960-4900.

We appreciate your concern for endangered species.

Sincerely yours,

Dennis B. Jordan
Dennis B. Jordan
Field Supervisor
Endangered Species Field Office

cc: D, FWS, Washington, D.C. (AFA/OES)
RD, FWS, Atlanta, GA (AFA/SE)
Department of Wildlife & Fisheries, New Orleans, LA
ES, FWS, Lafayette, LA
Bruce Stewart, Espey, Huston & Associates, Austin, TX

Jay Pruett - copy will also be
sent to Terri Slattery US Fish & Wildlife.
DRW

RECEIVED
DRW
FEB 25 1983

**The Dolet Hills
Mining Venture**

COSTAIN

JONES

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone: 318 688 3500
Telex: 5109734093
DHMV SHV

RHS/1.0/pa

February 23, 1983

Mr. Gary Gilino
U. S. Army Corps of Engineers
New Orleans District
P. O. Box 60267
New Orleans, LA 70160

Dear Mr. Gilino:

Mr. James Welsh, Chief of the Surface Mining Division, Louisiana Department of Natural Resources, has requested that I provide you with a copy of our Surface Mining Permit Application, ref. LSM-3, as submitted to him yesterday.

Section 3.0 (page 3-70 and 3-79) and Section 4.0 (page 4-12) of LSM-3 refers to the wetlands as determined by your office last year. (ref. letter dated 19 August 1982 from C. W. Decker to Clinton B. Spotts of EPA).

Drawing 1024, Sheet 2 in the map folio of LSM-3 shows the wetland areas in accordance with The U.S.Corps of Engineers determination.

You may recall that I visited you and Mr. Thom Davidson last December with our consultant, Dr. Frank Camp of Tera Corporation, to discuss the need for a Section 404 Permit for the Dolet Hills Lignite Mine. At that time you felt that in view of the small areas of wetlands present within the permit area, a 404 permit would not be needed and that the project would be approved under a nationwide permit.

I should be grateful if you could now review the information provided in LSM-3 and make an official determination of the necessity for a 404 permit for the project.

This letter is copied to Mr. Welsh and I should be grateful if you could also provide him with a copy of your reply. Mr. Welsh's address is -

Surface Mining Division
Office of Conservation
State of Louisiana - P.O.Box 44275
Baton Rouge, LA 70804

Yours sincerely,

RHS

R. H. Samuel
Project General Manager

cc: Mr. James H. Welsh (Mr. D. R. Williamson - Mr. F. A. Camp)

Rec'd Mar. 24, 1983
DRW

D.H. - mine - 404

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160

March 16, 1983

Reply To Attention Of

Operations Division
Regulatory Functions Branch

Dolet Hills Mining Venture
RECEIVED MAR 2 3 1983
COPY TO
DRW ✓
FAC.

Mr. Ronald H. Samuel
Costain Jones
Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

Dear Mr. Samuel:

This is with respect to your letter dated February 23, 1983 submitting your State of Louisiana Surface Mining Permit application, LSM-3 for our review and requesting a Department of the Army (DOA) permit jurisdictional determination for your proposed Dolet Hills surface mining project. The location of this project is east-southeast of Mansfield in De Soto Parish, Louisiana, as shown on your maps.

We have reviewed this project and determined that under current regulations that your work in the wetlands at this site is authorized by nationwide permit as specified in 33 CFR 330.5(a)(21) of our regulations dated July 22, 1982 (copy enclosed). Therefore, no individual DOA permit is required at this time. Because of the extended time frame of this project, you are advised that our regulations are subject to change. Therefore about 6 months before work is actually done in the wetland areas, you should again ascertain from us whether this nationwide permit regulation is still applicable to your project. If the nationwide permit is not applicable at that time, an individual DOA permit may then be required.

cc: J. A. Pavetto
Paul Tarragano
DRW

If you have any questions regarding this matter, please contact Mr. Gary D. Gilino at (504) 838-2273.

Sincerely,

Ronald J. Ventola

Ronald J. Ventola
Chief, Regulatory Functions Branch
Operations Division

Enclosure

Copy Furnished:
Mr. James Welsh
Office of Conservation
P. O. Box 44275
Baton Rouge, Louisiana 70804

~~Recd Mar. 10, 1983~~
D.H.-mine-MSH

U. S. Department of Labor

Mine Safety and Health Administration
P.O. Box 817
McAlester, Oklahoma 74501

1983

File 3.1.
DRW ✓

March 2, 1983

R.H. Samuel, Project General Manager
The Dolet Hills Mining Venture
South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

Dear Mr. Samuel:

Your assigned Federal Identification Number is 16-01031. This number will remain with the mine until completion of all mining activities.

Mr. Don Summers, Coal Mine Inspector, is stationed in Tyler, Texas and his phone number is 214/593-8818. The Coal Mine Inspection Supervisor (James Dorton) and Subdistrict Manager (Don Gabriella) are stationed in the McAlester, Oklahoma Subdistrict Office, phone number 918/423-5966.

Should you have any questions concerning your operation or construction of your operation, I can be contacted at the above number.

Sincerely yours,

Donald Gabriella

Donald Gabriella
Subdistrict Manager

cc: District Office
J. Dorton
D. Summers

2. State and Local Agencies

Louisiana Department of Natural Resources, Solid Waste Management Division. On 20 December 1982, DHMV requested an exemption from the Louisiana Solid Waste Management Program regulatory requirements since waste disposal is regulated by the Louisiana Office of Conservation. On 8 March 1983, the request for an exemption was granted.

Louisiana Department of Natural Resources, Water Pollution Control Division. The Water Pollution Control Division has been provided with the Draft NPDES permit, parts of Environmental Control Commission Form SCC 2, and an affidavit for their review and processing.

Louisiana Department of Health and Human Resources, Department of Environmental Programs. On 3 March 1983, DHMV requested approval of the sanitary wastewater treatment and facility water supply plans for the Dolet Hills Lignite Mine.

Louisiana Department of Natural Resources, Office of Conservation, Surface Mining Division. On 9 June 1983, LOCSMD approved the Dolet Hills Surface Mining Permit Application.

On 18 March 1983 the Surface Mining Division issued a letter of negative determination for 7,217 acres of prime farmland acreage on controlled tracts within the proposed Dolet Hills Lignite Project permit area. Approximately 227 acres are historically prime farmland soils and LOCSMD regulations require that topsoil from this acreage must be segregated, stockpiled, and replaced.

De Soto Soil and Water Conservation District. In April 1983, the De Soto Soil and Water Conservation District signed a cooperative agreement in which the District agrees to assist in developing a soil and water conservation plan for the Dolet Hills Mine project area, and DHMV agrees to carry out a good conservation program.

The Dolet Hills
Mining Venture

COSTAIN

JONES

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone 318 688 3500
Telex 5109734093
DHMV SHV

RHS/3.1/pa

December 20, 1982

Mr. John Koury
Administrator
Solid Waste Management Division
Louisiana Department of Natural Resources
P. O. Box 44066
Baton Rouge, Louisiana 70804

Subject: Request for Exemption from Louisiana Solid Waste Management Program Regulatory Requirements for the Proposed Dolet Hills Lignite Project

Dear Mr. Koury:

The Dolet Hills Mining Venture hereby requests an exemption from the regulatory requirements of the Louisiana Solid Waste Management Program as they might apply to the proposed Dolet Hills Lignite Project Surface Mine in De Soto Parish, Louisiana. We respectfully request this exemption as per Section 4.1.1E of the Solid Waste Rules and Regulations which relates to wastes that may be regulated under other authority. All aspects of the proposed mining operations will be regulated under the authority of the Louisiana Office of Conservation.

The Dolet Hills Lignite Project Mine will provide lignite as a fuel source for the Dolet Hills Power Plant near Naborton, Louisiana. Site preparation activities are scheduled to begin in mid-1983 following receipt of all permits and approvals, and initial lignite deliveries to the plant are scheduled for 1986. The proposed mine will operate for 34 years. The project area encompasses approximately 30,000 acres located east-southeast of Mansfield, Louisiana.

There will be several types of solid wastes generated by project operations. The wastes include the following:

- Domestic sewage
- Maintenance wastes

Sewage will be treated by a 3 cell biological oxidation lagoon or a packaged aeration unit with secondary treatment. The treatment facilities will be installed at the main office, field office, and workshop complexes.

Effluent will be discharged via sedimentation ponds to the natural drainage systems in compliance with all regulatory requirements.

Portable chemical toilets will be provided for use during mine construction and for the convenience of equipment operators remote from the permanent facilities. This waste will be disposed of by a contractor hired to service the portable toilets.

The mine operating company will be responsible for proper maintenance of the sewage treatment and disposal facilities. Waste arising from the maintenance of mining equipment will be placed and stored in designated areas adjacent to each of the workshops. Waste will be sorted into saleable machinery scrap, oils, grease, paints and flammable liquids, rubber tires, and general garbage.

Saleable waste will be sold at intervals, while other solid waste will be transported to a permitted land fill area or buried within selected dragline cuts where impervious overburden will provide appropriate protective barriers.

The Dolet Hills Mining Venture submitted its Surface Mining Permit Application LSM-3 to Mr. Jim Welsh of the Louisiana Office of Conservation on October 13, 1982. This submittal was in accordance with all regulatory requirements of the Louisiana Surface Mining Regulations. The basis for our request for an exemption is that Section 180.11(b)(4) of the Louisiana Surface Mining Regulations requires that information be submitted regarding proposed waste handling plans. Also, Sections 216.81 through 216.93 of the regulations provide operational performance standards for handling wastes. Therefore, these waste handling activities are regulated under other authority. We understand that the off-site disposal activities described above are under your authority and that transporters and disposers must be approved under your regulations.

Please contact me if you have questions regarding the information supplied herein. We would appreciate rapid processing of our exemption request.

Yours sincerely,

R. H. Samuel
Project General Manager

RHS/pa

CC: Mr. David R. Williamson
Mr. Frank A. Camp

State of Louisiana

FRANK P. SIMONEAUX
SECRETARY
B. JIM PORTER
ASSISTANT SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS

SOLID WASTE MANAGEMENT DIVISION

JOHN KOURY
ADMINISTRATOR

January 17, 1983

Dolet Hills Mining Venture
RECEIVED JAN 25 1983 S.I.
CIRCULATE E.A.
COPY TO F.G. DRW

Mr. R. H. Samuel
Project General Manager
Dolet Hills Mining Venture
Costain Mining
South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

Dear Mr. Samuel:

Re: Proposed Dolet Hills Lignite Project

This is in response to your letter of December 20, 1982. Your request for exemption from the Louisiana Solid Waste Management Plan for the disposal of solid wastes as described in your letter cannot be granted by this Office at this time.

The Solid Waste Rules and Regulations (SWRR) specifically exclude (not exempt) under Section 4.1.1.E., "Mining overburden, spoil, and tailings . . . regulated under other authority." The wastes described in your letter, namely maintenance wastes, are not included in the definitions of overburden, spoil, or tailings.

Unless you can demonstrate that the disposal of "maintenance wastes" is indeed regulated by the Office of Conservation, a Solid Waste Permit or exemption therefrom will be required. In order to apply for an exemption from the permitting requirements, a more detailed and thorough description of waste handling procedures must be submitted to Mr. Porter with a formal request for exemption as provided under SWRR Section 4.1.2.

Should you have any questions or require assistance, please contact this Office.

Sincerely,

John Koury
JOHN KOURY
Administrator

JK:pcb

Office of Conservation

**The Dolet Hills
Mining Venture**

COSTAIN

JONES

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone 318 688 3500
Telex 5109734093
DHMV SHV

February 7, 1983

Mr. John Koury
Administrator
Solid Waste Management Division
Office of Environmental Affairs
Louisiana Department of Natural Resources
P. O. Box 44066
Baton Rouge, LA 70804

Subject: Request for Exemption From Louisiana Solid Waste
Management Program Regulatory Requirements
for the Proposed Dolet Hills Lignite Project

Dear Mr. Koury:

Thank you for your letter of January 17, 1983 which responded to my earlier letter of December 20, 1983 regarding the need for a Solid Waste Permit for the Dolet Hills Lignite Mine. Since receipt of your response, Dr. Frank Camp of TERA Corporation (who is assisting us with project permitting) has communicated with Ms. Barbara DeLatte of your staff regarding how to respond appropriately to your letter.

We understand from Ms. DeLatte that you require confirmation that the maintenance wastes described in my December 20 letter are in fact regulated under the authority of the Louisiana Office of Conservation, Surface Mining Division. I have enclosed for your review a copy of Section 216.89 of the Louisiana Surface Mining Regulations which deals with disposal of noncoal wastes. The maintenance wastes described in my December 20 letter are classified as noncoal wastes by the Louisiana Surface Mining Regulations and are regulated by the Office of Conservation, Surface Mining Division, under Section 216.89. I am providing Mr. Jim Welsh, Chief of the Surface Mining Division, with copies of my December 20 letter, your January 17 letter, and this letter and am requesting that he confirm in a letter to you that these wastes will be regulated under the Louisiana Surface Mining Regulations.

Upon receipt of the enclosed information and a confirmation from Mr. Welsh, we respectively request that you confirm for us in writing that the solid wastes associated with the mine are regulated under other authority and that a separate permit from your office is not required. We will be most happy to provide you with any additional clarifying information which you may require. Don't hesitate to contact me at your convenience if you have additional questions.

Yours sincerely,

Ronald H Samuel

R. H. Samuel
Project General Manager

Enclosures
cc: Mr. Jim Welsh cc: Mr. D. R. Williamson

D.# [illegible] RECEIVED
DRW
FEB 10 1983

The Dolet Hills
Mining Venture

COSTAIN

JONES

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone: 318 688 3500
Telex: 5109734093
DHMV SHV

February 7, 1983

Mr. James H. Welsh
Chief
Surface Mining Division
Office of Conservation
Department of Natural Resources
State of Louisiana
P. O. Box 44275
Baton Rouge, Louisiana 70804

Subject: Applicability of Louisiana Surface Mining Regulations to Noncoal Wastes for the Dolet Hills Lignite Project

Dear Mr. Welsh:

Enclosed please find copies of three letters which represent our recent correspondences with Mr. John Koury of the Louisiana Solid Waste Management Division of the Office of Environmental Affairs. We understand that a Solid Waste Permit is not needed for the project if disposal of such wastes is regulated under other authority. We also understand that the Solid Waste Management Division recently determined that Dow's proposed on-site disposal activities for the Castor Bayou Project were excluded from the purview of the Solid Waste Program. We are attempting to obtain a similar exclusion for the Dolet Hills Lignite Project.

We respectfully request that you confirm your office's regulatory authority over these wastes in a letter to Mr. Koury. We certainly will appreciate your assistance in this matter. Please contact me if you have any questions.

Yours sincerely,

R. H. Samuel
Project General Manager

RHS/pa
cc: Mr. David Ray Williamson
Enclosures

Rec'd Mar. 23, 1983
DRW

D.H. - mine - state solid waste

State of Louisiana

FRANK P. SIMONEAUX
SECRETARY
B. JIM PORTER
ASSISTANT SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS

SOLID WASTE MANAGEMENT DIVISION

LHS
JOHN KOURY
ADMINISTRATOR

March 8, 1983

Dolet Hills Mining Venture
RECEIVED MAR 16 1983 3.1.
DRW ✓
FAC.

Mr. R. H. Samuels
Project General Manager
Costain Jones
South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

Dear Mr. Samuels:

Re: Dolet Hills Lignite Project

Receipt of your letter of February 7, 1983, and Mr. James H. Welsh's letter of February 16, 1983, is acknowledged. Allowing that maintenance wastes described in your letter of December 20, 1982, are regulated under the Office of Conservation, a Solid Waste Disposal Facility Standard Permit is not necessary.

Should you require further assistance, please contact this office.

Sincerely,

John Koury

JOHN KOURY
Administrator

JK:pcb

cc: Jim Welsh

cc Jay A Pruett
Paul Tarragano
DRW.

RECEIVED

NOV 1 1982

**The Dolet Hills
Mining Venture**

COSTAIN

JONES

October 28, 1982

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone 318 688 3500
Telex 5109734093
DHMV SHV

Mr. J. Dale Givens
Administrator
Louisiana Department of Natural Resources
Water Pollution Control Division
P.O.Box 44066
Baton Rouge, Louisiana 70804

Subject: Submittal of Permit Application to
Discharge Wastewater for the Dolet Hills Mining Venture
Dolet Hills Lignite Project, De Soto Parish, Louisiana

Dear Mr. Givens:

Enclosed for your review and processing are three (3) copies of a Permit Application to discharge wastewater from the proposed Dolet Hills Mining Venture, Dolet Hills Lignite Project, De Soto Parish, Louisiana. The discharge for which this application is being made will consist of intermittent releases from 23 sedimentation ponds which will operate within the requested 1983 through 1988 permit term.

In accordance with Water Pollution Control Division requirements, the enclosed application consists of:

1. The National Pollutant Discharge Elimination System (NPDES) Standard Form C (included as an Appendix),
2. Sections III and IV of the Environmental Control Commission Form SCC 2, and
3. An Affidavit.

The NPDES Permit Application was submitted to the U. S. Environmental Protection Agency on October 12, 1982.

We would appreciate your expeditious processing of this application so that project schedules can be met. Please contact me if additional information is needed, or if you have any comments or questions relative to the enclosed application.

Sincerely,

R H. S.

R. H. Samuel
Project General Manager

RHS/pa
Enclosures
CC: D. R. Williamson (with enclosures)

state
water
permit

The Dolet Hills
Mining Venture

COSTAIN

JONES

South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport
Louisiana 71118

Phone 318 688 3500
Telex 5109734093
DHMV SHV

RHS/3.1/pa

March 3, 1983

Mr. August Babin
Louisiana Department of Health
and Human Resources
Department of Environmental Programs
Categorical Programs Section
P. O. Box 60630
New Orleans, Louisiana 70160

Subject: Request for Approval of Sanitary Wastewater Treatment and Facility Water Supply Plans for the Dolet Hills Lignite Mine

Dear Mr. Babin:

The purpose of this letter is to request the approval of the Louisiana Department of Health and Human Resources for Proposed Sanitary Wastewater Treatment and Facility Water Supply Plans for the Dolet Hills Lignite Mine. I have enclosed three (3) copies of our proposed plans for your review.

The Dolet Hills Lignite Mine will be located in DeSoto Parish, Louisiana, to the east-southeast of Mansfield. The mine will supply fuel to the Dolet Hills Power Plant which currently is under construction near Naborton. Additional details concerning project plans and schedules are provided in the enclosed plans. Because both sanitary and drinking water facilities will be needed at the main mine office and field workshops, we respectfully request your review and approval of our proposed plans.

We understand that you will require a set of plans, a set of specifications, and a set of completed design data forms for both the proposed sanitary and drinking water facilities. This information currently is being developed by our engineering consultant, S. E. Huey Co. of Monroe, Louisiana. Representatives of S. E. Huey Co. have been in contact with Mr. Perry Watson, your Regional Engineer for DeSoto Parish, regarding the appropriate state standards and requirements for the plan. The plans, specifications, and data forms will be transmitted to you upon completion.

We request your expeditious review and approval of the enclosed plans. Please contact me at your convenience with any questions you may have.

Yours sincerely,

R. H. Samuel
Project General Manager
Enclosures (cc: F. A. Camp - D. R. Williamson)

State of Louisiana

PATRICK H. MARTIN
COMMISSIONER

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION
SURFACE MINING DIVISION

JAMES H. WELSH
CHIEF OF SURFACE MINING

March 18, 1983

Dolet Hills Mining Venture
South Park Office Plaza
Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

Attention: Mr. Ron Samuel
Project Manager

Re: Letter of Negative Determination
for Prime Farmland Acreage
Dolet Hills Lignite Project (LSM-3)
DeSoto Parish, Louisiana

Dear Mr. Samuel:

This Office has completed an investigation of the S.C.S. Prime Farmland soils on controlled tracts within the proposed Dolet Hills Lignite Project permit area.

Interpretation of aerial photography and a review of on-site investigations and interview forms have resulted in our determination that for the tracts within the permit area which Cleco/Swepco currently has the right to mine as shown on Drawing 1001 in the Surface Mining Application LSM-3, approximately 227 acres are historically Prime Farmland soils; said determination based on evidence that showed that these tracts have been used for cropland at least five or more years out of the ten years immediately preceding tract acquisition. These historical Prime Farmland areas are shown on Revised Drawing 1022 in LSM-3.

Therefore, of the 7,444 acres of S.C.S. Prime Farmland within the permit area, 7,217 acres are hereby granted a negative determination based on the criteria outlined in Section 179.27(b)(1) of Statewide Order 29-0-1.

A historical Prime Farmland determination will be made by the Office on additional tracts of land as the right to mine is obtained and the Office notified. No tracts may be disturbed before the determination is made.

Yours very truly,

PATRICK H. MARTIN, COMMISSIONER
Office of Conservation

By James H. Welsh
James H. Welsh, Chief
Surface Mining Division

PHM:JHW:mr

cc: Mr. David R. Williamson, Cleco/Swepco

POST OFFICE BOX 44275 . BATON ROUGE, LOUISIANA 70804-4275 . PHONE (504) 342-5540

DeSoto Soil and Water Conservation District
P.O. Box 32 - Mansfield, Louisiana 71052 - Phone 872-4949
Location: 211 Washington Avenue - Mansfield, Louisiana - Phone 872-4949

COOPERATIVE AGREEMENT

This agreement is entered into by the DeSoto Soil and Water Conservation District, referred to hereinafter as the "District", and

DOLET HILLS MINING VENTURE
9029 MANSFIELD RD. referred to hereinafter as the "Cooperator."
SUITE 209/210
SHREVEPORT, LOUISIANA 71118

THE DISTRICT AGREES TO:

1. Supply soils and capability information and assist in developing a soil and water conservation plan for the land.
2. Assist in carrying out the conservation plan by furnishing to the Cooperator such (a) information, (b) technical assistance and supervision, and (c) other assistance as it may have available at the time the work is to be done.

THE COOPERATOR AGREES TO:

1. Upon requesting this assistance to develop and carry out a good conservation program, and use his land within its capabilities, and treat the land in keeping with its needs.

IT IS MUTUALLY AGREED THAT:

1. This agreement and conservation plan will be and remain the property of the landowner and copies thereof will not be released by the District to a third party except upon the written approval of the landowner.
2. The members of the District governing body or their representatives will have the right to ingress and egress to my property during the agreement for the purpose of conducting surveys, planning, installing, or inspecting conservation measures or structures.
3. Provisions of this agreement are understood by the cooperator and District.
4. This agreement may be terminated by either party upon giving notice to the other party.

Date ____ Owner ____

March 9, 1983 L. H. Samuel
Date Operator

DESOTO SOIL AND WATER CONSERVATION DISTRICT

BY ____

Rec'd Mar. 30, 1983
DRW

DeSoto Soil and Water Conservation District
P.O. Box 32 · Mansfield, Louisiana 71052 · Phone 872-4949
Location: 211 Washington Avenue · Mansfield, Louisiana · Phone 872-4949

March 29, 1983

file 3.1.

copy DRW.

E.A. —
C.A.A. —

Mr. Ronald H. Samuel
Project General Manager
Dolet Hills Mining Venture
902 Mansfield Road
Suite 209/210
Shreveport, La. 71118

Dear Mr. Samuel:

It is our pleasure and a priviledge to have you, the Dolet Hills Mining Venture, as a cooperative organization interested in working toward the conservation of soil, water and related resources, and at the same time utilizing our natural resources to provide for a better standard of living. The DeSoto Soil and Water Conservation District and the technical staff of the Soil Conservation Service is available to assist you in your efforts and goals to protect the environment.

We want you to feel free to call on us when you feel we can be of some service to you.

Sincerely,

Malcolm L. McDonald

Malcolm L. McDonald, District Conservationist
Representing the DeSoto Soil & Water Conservation
District

MLM;h

cc: Harry Rucker, State Conservationist, Alexandria, Louisiana
Garland Colvin, Area Conservationist, Shreveport, Louisiana

cc: Jay Pruett
Paul Turregano
DRW

3. Public Hearing Summary

A Public Hearing on the SDEIS was held on 15 March 1983 at the De Soto Parish Instructional Material Center in Mansfield, Louisiana. One public issue was raised which focused on concerns related to increased noise levels during mine operations in proximity to Antioch Church and Mansfield Battle Park. The remaining public issues addressed individual lease agreements which are not subject to this environmental review process.

4. List of Agencies, Organizations, and Persons to Whom Copies of the Supplemental Final Statement Are Sent

USEPA, Washington, D.C.
Department of Health and Human Services, Atlanta, GA
Soil Conservation Service, Alexandria, LA
U.S. Corps of Engineers
    New Orleans District, New Orleans, LA
    Ft. Worth District, Ft. Worth, TX
U.S. Department of the Interior, Albuquerque, NM
U.S. Fish and Wildlife Service,
    Lafayette, LA
    Jackson, MS
Louisiana Department of Culture, Recreation and Tourism, Baton Rouge, LA
Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA
Louisiana Office of Conservation, Surface Mining Division, Baton Rouge, LA
De Soto Soil and Water Conservation District, Mansfield, LA
Daniel T. Morris, New Orleans, LA

PART III

MODIFICATIONS AND CORRECTIONS TO THE SUPPLEMENTAL DRAFT EIS

PART III MODIFICATIONS AND CORRECTIONS TO THE SUPPLEMENTAL DRAFT EIS

Modifications and corrections to the Supplemental Draft Environmental Impact Statement (SDEIS) as the result of changes by EPA, DHMV, or from comments by agencies or individuals are presented in this section. Modifications to the summary (Section 1.0 of the SDEIS) are not included in Part III of the SFEIS since the entire summary has been updated and is included as Part I of this document. Additionally, revisions to Section 6.0 of the SDEIS are included in the updated section on coordination in this document (Part II, B). Table 3-1 provides an index to the pages from the SDEIS that were revised, as well as a reference to the commenting agency which brought about the revision.

TABLE 3-1

INDEX OF REVISIONS TO THE DOLET HILLS SURFACE LIGNITE MINE PROJECT DRAFT SEIS[a]

Draft EIS Page No.	Commenting Agency[b]	Final EIS Page No.
4-1		III-4
4-8	DOI	III-5
4-10		III-6 and 7
4-17		III-8
4-19		III-9
4-21		III-10
4-24		III-11
4-37		III-12
4-47	LDWF, USCE, DOI, WMI	III-13 - 16
4-49	SCS, LDWF	III-17
4-50	LDWF	III-18
5-1	DHHS	III-19
5-5	DHHS	III-20
5-10		III-21
5-18	DHHS	III-22
5-21		III-23
5-23		III-24
5-28	DHHS	III-25
5-48	DHHS	III-26
5-49		III-27
5-54		III-28
5-60	DHHS	III-29
5-62	DHHS	III-30
5-67	DHHS	III-31
5-68	DHHS	III-32
5-78		III-33
5-80		III-34
5-82	DHHS	III-35
5-85	LDWF, DOI	III-36

TABLE 3-1 (Concluded)

Draft EIS Page No.	Commenting Agency[b]	Final EIS Page No.
5-87		III-37
5-93	USCE, DOI	III-38
N/A	USCE, DOI	III-39
5-93	DHHS	III-40
5-95	LDWF, DOI	III-41
5-97	DOI, WMI	III-42
5-102	DHHS	III-43
5-108	SHPO	III-44
5-109	DHHS, SHPO, DOI	III-45
5-110	SHPO	III-46
5-111	SHPO	III-47
5-114 & 5-115	DHHS	III-48 and 49
5-148	DHHS	III-50
5-154	DOI	III-51 and 52
5-155		III-53
8-1		III-54
8-3		III-55
8-4		III-56
8-6		III-57
8-7		III-58
8-8		III-59
8-9		III-60

[a] Revisions on the following pages are indicated by a vertical line in the margin.

[b] DHHS = Department of Health and Human Services
DOI = U.S. Department of the Interior
LDWF = Louisiana Department of Wildlife and Fisheries
SCS = Soil Conservation Service
SHPO = State Historic Preservation Officer
USCE = U.S. Army Corps of Engineers
WMI = Wildlife Management Institute

4.0 DESCRIPTION AND EVALUATION OF ALTERNATIVES

4.1 NO ACTION ALTERNATIVE OF THE APPLICANT

Implementation of the no action alternative would mean that the site preparation, construction, and operation of the proposed project would not occur. If the proposed mine was not developed, environmental conditions within the permit area could potentially remain as they are now. However, in the four-parish project area (De Soto, Red River, Natchitoches, and Sabine), economic development is presently occurring and is expected to continue. Lignite development is rapidly becoming a major component of industrial activity; in De Soto Parish, lignite reserves are estimated at 546 million tons (Roland et al., 1976). Pursuit of mining activities in the general area will probably increase in-migration, housing needs, community service needs, income, etc. If the applicant does not mine the proposed permit area, another entity may wish to.

Without the mine, demands for electrical power within the respective service areas, will have to be reduced or met by other means. If service is reduced, future economic growth in the areas could be affected. If not reduced and the proposed mine is not constructed, the increased power needs would be supplied from the Dolet Hills Power Plant utilizing another fuel source, at higher costs passed on to the consumer.

4.2 ALTERNATIVE ENERGY SOURCES FOR THE DOLET HILLS POWER PLANT

On 2 June 1981, EPA issued a Notice of Intent to prepare an EIS on its NPDES permit action for the proposed Dolet Hills Power Plant. As a part of the environmental review, numerous energy source alternatives were considered for the power plant, including coal and petroleum gasification, natural gas, western coal, lignite, and nuclear power (EPA, 1981). Even though lignite has considerably more bulk than bituminous coal, and is, therefore, less economical to transport long distances, it was selected as the most economical energy source available to the Dolet Hills Power Plant and is therefore SWEPCO/CLECO's preferred alternative. After the completion of the environmental review, EPA issued the NPDES permit for the power plant on 25 June 1982.

reduce the need of a complex and expensive road system and are much less expensive to relocate than a rail system as the mining sequence progresses.

4.3.5.4 Combination

A combination of a conveyor system and haul trucks is the applicant's preferred alternative. The conveyor system will transport lignite to the mine. Haul trucks will be used to transport lignite from the lignite removal point to central conveyor loading points.

4.3.6 Reclamation Alternatives

The following postmining land use reclamation alternatives were evaluated.

1) Area land use would be reclaimed to premining land use.
2) Area land use would be reclaimed to premining land use with enhancement of fish and wildlife habitat.
3) Area land use would be changed to primarily pasture rather than forest.
4) Area land use would be changed to primarily commercial forest.
5) Area land use will consist primarily of both managed and unmanaged forest with some restoration to pastureland, fish and wildlife habitat, and water resources.

The fifth alternative is the preferred alternative most closely reflects landowner desires. Virtually all of the landowner lease agreements require return of the land to either commercial forest or pasture (Camp, 1982). In those disturbed areas of leased land where the applicant has the choice of selecting the postmining land use, the criteria used has been to return the land to its premining use (i.e., forest or pasture) and thus avoid a change in land use. In these cases, areas restored to a forest land use will be primarily wildlife habitat. LOCSMD will require that DHMV periodically reassess landowner wishes concerning establishment of additional wildlife habitat during the course of mining. The total fee land to be mined that is owned by SWEPCO/CLECO without obligation is approximately 203 hectares (500 acres). This land is distributed in nine 4.0-32.4 hectare (10-80 acre) tracts in the eastern and western portions of the area to be mined. Fee land consisting of vegetation condusive to wildlife habitat (i.e., bottomland and upland forest) will be returned to its premining state. The remaining fee land (i.e., pasture, gravel pits, etc.) will be primarily reclaimed as improved wildlife habitat suitable to that location.

areas where the unoxidized sandy material is absent, near surface oxidized overburden will be placed on the surface.

4.3.7 Sanitary Waste Disposal Systems Alternatives

Four sanitary waste systems were considered for the proposed Dolet Hills Lignite Mine Project facilities: (1) existing sewage treatment plant; (2) septic tank; (3) packaged plant; and (4) oxidation lagoon. Sanitary waste will be treated at the main office and workshop, the field workshops, and the dragline erection site.

4.3.7.1 Existing Sewage Treatment Plant

The sewage treatment plant nearest the proposed mine ancillary facilities is located in Mansfield, approximately 9.6 kilometers (6 miles) to the west. Piping sewage this distance would be unacceptably costly, so this method of disposal was eliminated from consideration.

4.3.7.2 Septic Tank

A relatively large volume of sewage will be generated during both construction and operation of the mine. Although small-volume (residential) septic tank systems may be feasible given the soil conditions in the site area, the permanent ground-water level would affect the disposal of large volumes of wastes, resulting in adverse environmental effects. On these grounds, this waste disposal technique was deemed unsuitable.

4.3.7.3 Packaged Plant

A packaged extended aeration unit with secondary treatment was initially selected as the preferred sanitary waste disposal system. This system was subsequently rejected in favor of oxidation lagoons for secondary treatment because of the continuous maintenance required for the system to remain effective.

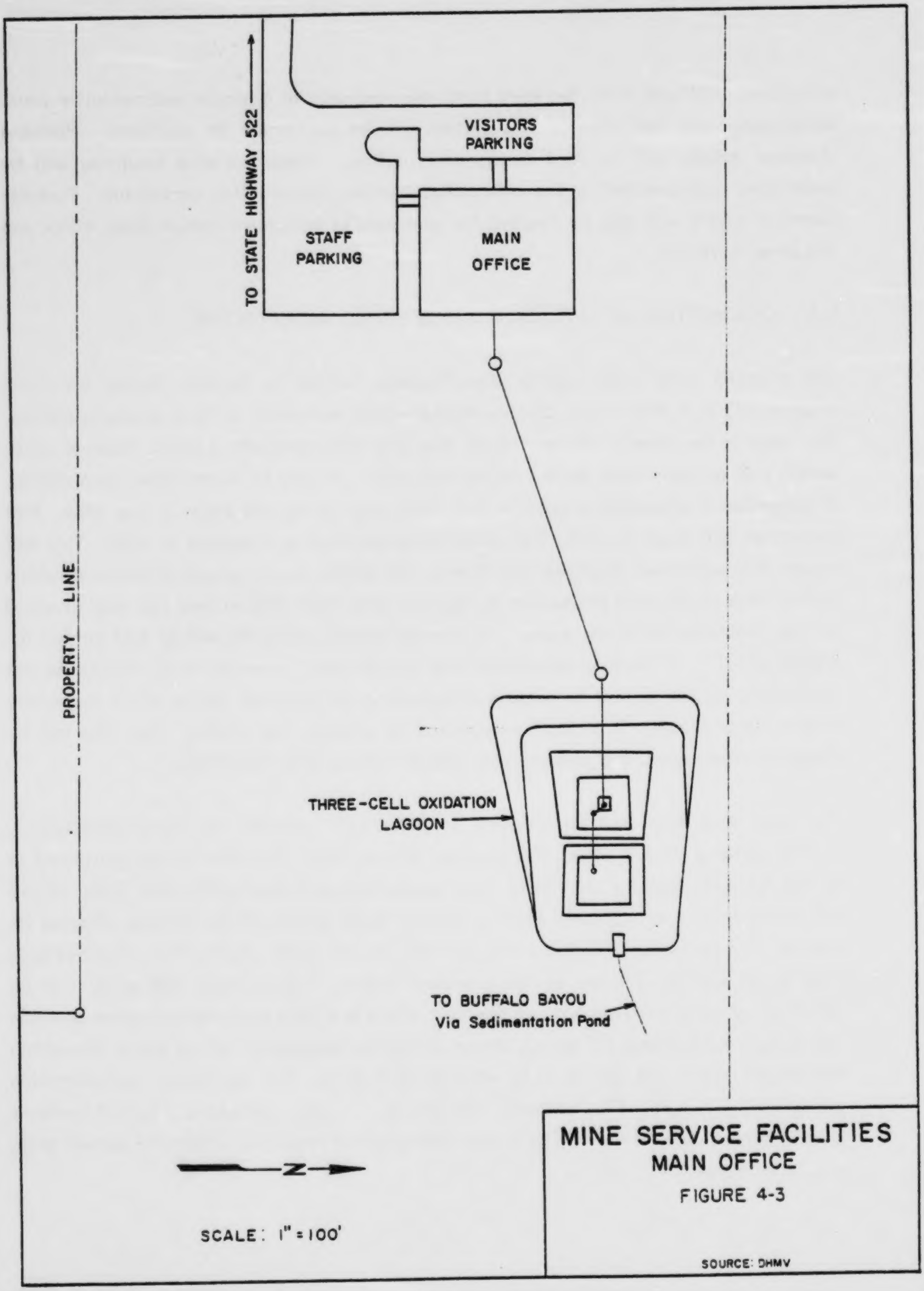
4.3.7.4 Oxidation Lagoon

A three-cell biological oxidation lagoon for secondary treatment is the sanitary waste disposal system chosen for use at the proposed Dolet Hills main office block and field complexes. Effluent from the third pond will discharge to a nearby sedimentation pond. Maintenance and operation of this system will be performed by applicant. Portable chemical toilets will be used during construction. These portable facilities will be maintained and operated by the office-shop complex construction contractor. Portable chemical toilets will also be supplied for operators of equipment remote from office and workshop facilities.

4.4 DESCRIPTION OF APPLICANT'S PREFERRED ALTERNATIVE

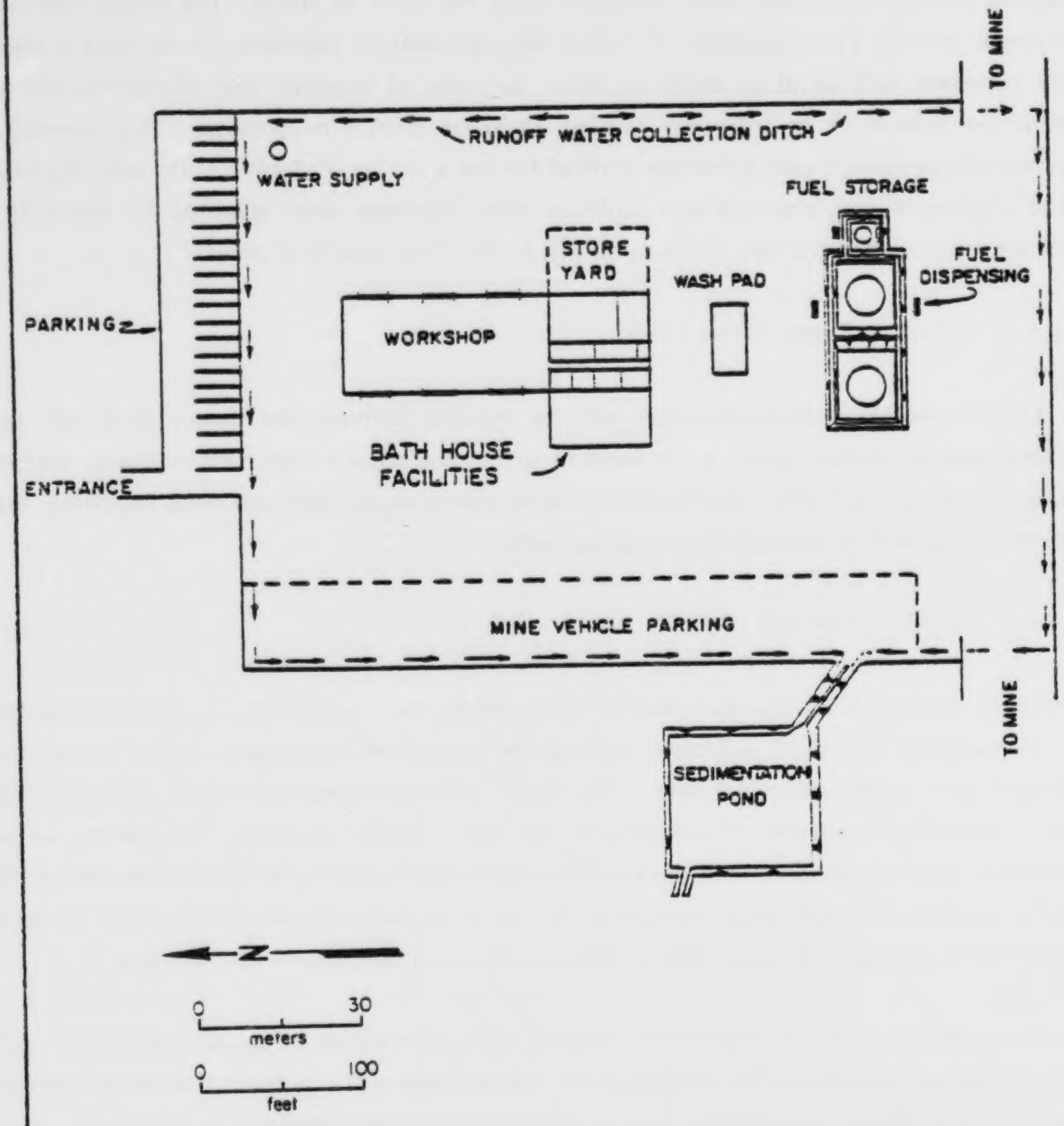
The proposed Dolet Hills Lignite Mine Project, located in De Soto Parish, Louisiana (Figure 4-1) is a single-seam dragline/bucket-wheel excavator surface mining operation. The seam to be mined is designated the blue bed (Chemard Lake Lentil), however small amounts of an uppermost seam (yellow bed) exist and may be mined when encountered. Construction is scheduled to begin in July 1983, and mining will begin in late 1985. Full production will begin in 1986, and maximum production is scheduled in 1992. This will require two additional draglines (and shortly thereafter, bucket-wheel excavators), which will be used to increase production to approximately 5.64 million tons per year (mmtpy) for the remaining life of the mine. The average annual production will be 4.41 mmtpy for a total of 141.1 million tons recoverable over the 32-year life of the mine. All mining and reclamation activities will be performed according to Louisiana Office of Conservation, Surface Mine Division (LOCSMD) regulations for surface coal mining. The mine will be designed, constructed, and operated for SWEPCO/CLECO by the DHMV.

The total area that will be affected or potentially affected by mine operations is 11,968 hectares (29,573 acres). For purposes of discussion, this area will be considered to be the "permit" area for the life of mine assessment contained within this SEIS. Within the permit area, approximately 6,259 hectares (15,466 acres) will be directly affected by mining, 70.8 hectares (175 acres) will be affected by road construction, 65.5 hectares (162 acres) will be affected by the conveyor system, 72.8 hectares (180 acres) will be disturbed by mine facilities such as the main office and field workshops, dragline erection will disturb 4.5 hectares (11 acres), stream diversions (outside of mining block, but within the permit area) will affect 11.2 hectares (27.8 acres), and permanent sedimentation ponds will disturb 27.6 hectares (68 acres). The remaining 5,467.9 hectares (13,511 acres), outside the mining blocks and ancillary areas but within the permit area, may be affected.


TO STATE HIGHWAY 522
VISITORS PARKING
STAFF PARKING
MAIN OFFICE
PROPERTY LINE
THREE-CELL OXIDATION LAGOON
TO BUFFALO BAYOU Via Sedimentation Pond
N
SCALE: 1" = 100'

MINE SERVICE FACILITIES
MAIN OFFICE
FIGURE 4-3

SOURCE: DHMV


TO MINE
RUNOFF WATER COLLECTION DITCH
WATER SUPPLY
FUEL STORAGE
STORE YARD
WASH PAD
FUEL DISPENSING
PARKING
WORKSHOP
BATH HOUSE FACILITIES
ENTRANCE
MINE VEHICLE PARKING
TO MINE
SEDIMENTATION POND
N
0
30
meters
0
100
feet

Sewage will be treated by 3-cell oxidation lagoons. Location will depend on site topography.

MINE SERVICE FACILITIES
FIELD WORKSHOP
Figure 4-5

SCURCE: DHMV

4.4.1.5 Conveyor System

An overland conveying system will be used to handle the lignite from the lignite loading hoppers to the power plant after transport from the mine by truck. The initial overland conveyor will be 11.1 kilometers (7 miles) long and will be paralleled by an access road. The conveyor will be of a design to allow for ease of erection and dismantlement to facilitate relocation to different mining areas as mining progresses. The conveying system will provide a cost-effective method for the transfer of lignite while reducing haul road aggregate requirements and fugitive dust. Surface area affected by the entire conveyor system for the life of the mine will be 57.5 hectares (142 acres).

4.4.1.6 Electric Transmission Lines

A 230 kV electric transmission line will be erected between the power plant and the mine's main substation which is not located within the permit area. From there, various lines will be routed to the electrically powered mining equipment, and mine facilities. All electric lines will be erected along access roads.

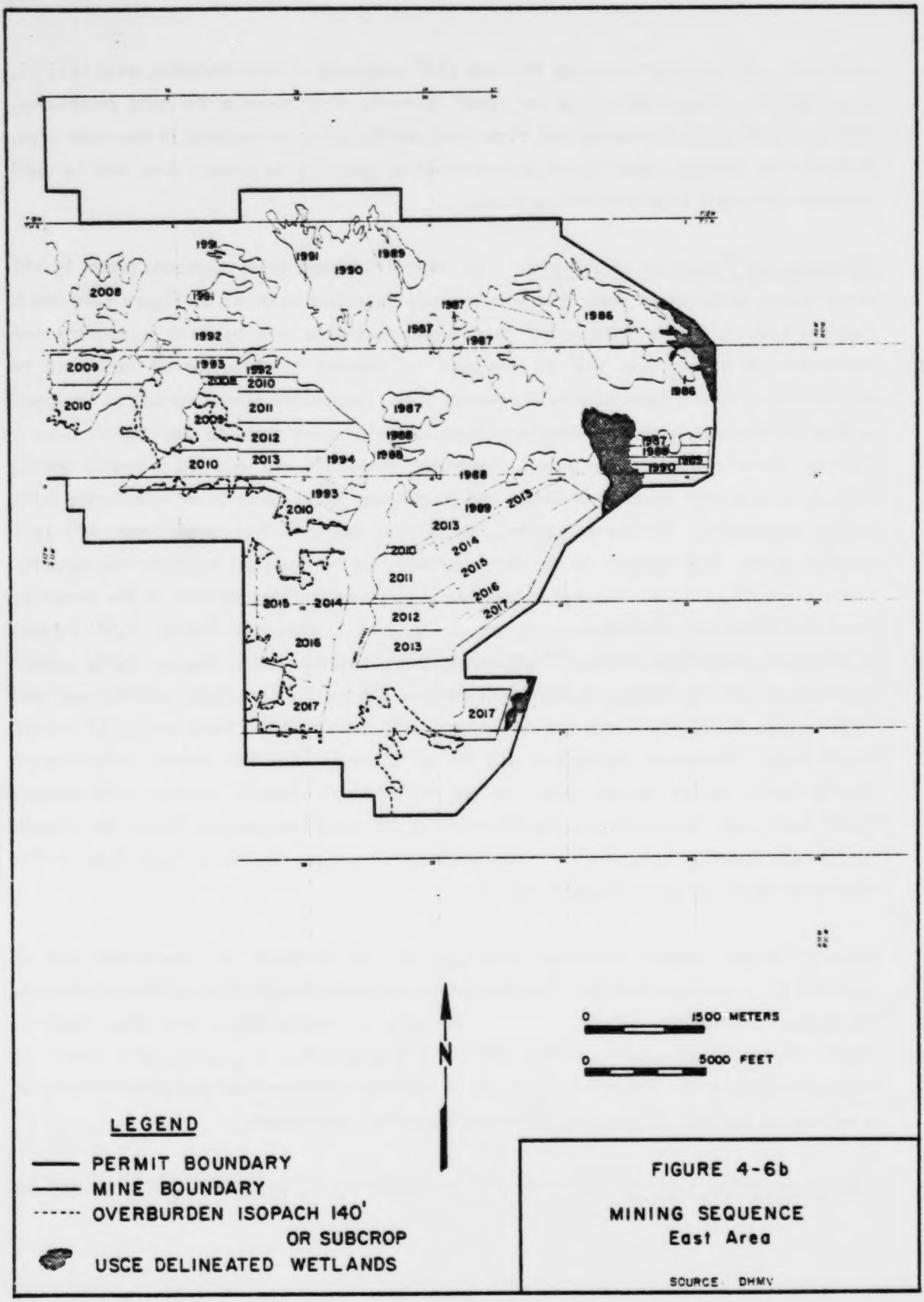
4.4.1.7 Waste Treatment

Domestic sewage from the main office block and the two field complexes will be treated by three-celled biological oxidation lagoons for secondary treatment, before being discharged into a sedimentation pond. The three units combined will treat approximately 8,516 liters (2,250 gallons) of wastewater per day. Before entering the sedimentation pond, the wastewater will meet the NPDES permit requirements for total suspended solids (daily average, 30 mg/l; daily maximum, 45 mg/l) and 5-day biochemical oxygen demand (BOD) (daily average, 30 mg/l; daily maximum, 45 mg/l) (see page 4 of Appendix A).

Wastewater produced by equipment washing will be treated in an oil separating unit before release into the sedimentation pond. Wastewater will also meet the NPDES permit requirements before release from the sedimentation pond downstream.

4.4.2 Mineable Reserves

Through an analysis of 2,498 drill holes and 150 lignite core holes, an economically recoverable deposit containing approximately 141.1 million tons of lignite has been


1991
1991
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1988
1993
2013
2010
1989
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2010
2014
2015
2011
2015
2014
2016
2017
2012
2016
2013
2017
2017
0
1500 METERS
0
5000 FEET
N
LEGEND
PERMIT BOUNDARY
MINE BOUNDARY
OVERBURDEN ISOPACH 140' OR SUBCROP
USCE DELINEATED WETLANDS

FIGURE 4-6b

MINING SEQUENCE
East Area

SOURCE: DHMV

ponds will also be constructed by the year 1997 upstream of sedimentation pond 6647.22, to be used as sedimentation ponds for runoff from disturbed areas as the mine progresses. Similar runoff control schemes are conceived for the other watersheds in the mine area. Additionally, storage capacities of several existing ponds in the project area may be used to minimize runoff to sedimentation ponds.

Diversion and Rerouting of Streams. To control drainage from upstream areas, it will be necessary to construct several stream channel diversions as shown on Figure 4-7a and b (Section 4.4.4.6). It is anticipated that these diversions will be both temporary and permanent in nature and will be designed to prevent contribution of sediment to streamflow or runoff from outside the permit area. Temporary diversions will be designed so that the channel, bank, and adjacent floodplain will safely pass the peak runoff from a 10-year, 24-hour precipitation event. Permanent diversions are required to enable mining through or near the existing channels and to prevent flood flows from interfering with mining operations. Permanent diversions will be designed for runoff from 100-year 24-hour event. The capacity of the channel itself will be designed to equal the capacity of the unmodified stream channel immediately upstream and downstream of the diversion itself. Temporary diversions will be as follows: Chatman Bayou, 2,591 meters (8,500 feet) and 2,134 meters (7,000 feet); West Branch Dolet Bayou, 2,286 meters (7,500 feet) and 610 meters (2,000 feet); Prairie Bayou, 3,658 meters (12,000 feet) and 1,676 meters (5,500 feet); and Louies Bayou, 1,829 meters (6,000 feet) and 1,219 meters (4,000 feet). Permanent diversions will be as follows: Chatman Bayou, 3,353 meters (11,000 feet); Louies Bayou, 2,667 meters (8,750 feet); Prairie Bayou, 2,286 meters (7,500 feet); and Tenmile Bayou, 2,438 meters (8,000 feet) (see Section 5.8.1.3 for stream locations). Tenmile Bayou will be temporarily diverted from the Sabine River Basin to the Red River Basin for approximately two years.

When no longer needed, temporary diversions will be removed, and the stream will be returned to a configuration that approximates premining stream channel characteristics. Permanent relocations will approximate the original length, slope, and other morphological characteristics, but location will be a displacement in position as a result of mining requirements. Figures 4-12 and 4-13 show the pertinent design characteristics of a temporary and permanent stream channel diversion, respectively.

Flood Prevention Levees. Levees will be necessary to prevent flooding caused by

Where pastureland or forest is not required by lease agreement as a postmining land use, reclamation procedures generally will be designed to achieve a postmining land use that is comparable to premining conditions. The areal extent of such tracts is discussed below. Wildlife habitat areas will be created around postmining ponds and diversions. Undisturbed lands within the permit area will remain in their premining land use.

At the present time, the amount of leased land in the permit area, which is not fee land or controlled land, is 10,003 hectares (24,699 net acres), of which 5,586 hectares (13,792 acres) will be mined. According to lease agreements, 50 percent (2,794 hectares or 6,899 acres) of the leased land to be mined must be planted in pine only following mining. Of the 2,794 hectares (6,899 acres) to be planted in pine only, 2,680 hectares (6,618 acres) are leased from timber companies (four companies). The total leased area to be mined which must be planted in pasture only, according to current lease agreements, is 738 hectares (1,822 acres). This is 13 percent of the leased land to be mined. At the individual landowner's option, the total leased area to be mined that must be planted in grass or pine seedlings only, according to current lease agreements, is 2,045 hectares (5,049 acres). This area totals 37 percent of the leased land to be mined. A remaining 0.1 percent of leased land to be mined must be returned to either grass or hardwood forest at the lessor's option. LOCSMD will require that DHMV periodically reassess landowner wishes concerning establishment of additional wildlife habitat during the course of mining.

The total fee land to be mined which is owned by SWEPCO/CLECO without obligation is approximately 203 hectares (500 acres). This land is distributed in nine 4.0-32.4 hectare (10-80 acre) tracts in the eastern and western portions of the area to be mined. Fee land consisting of vegetation condusive to wildlife habitat (i.e., bottomland and upland forest) will be returned to its premining state. The remaining fee land (i.e., pasture, gravel pits, etc.) will be primarily reclaimed as improved wildlife habitat suitable to that location.

4.4.5.2 Revegetation

Vegetation species will be planted at the first appropriate season for the species selected. Vegetation species to be planted have been selected based primarily on the intended postmining land use and species suitability for the project area. Other factors that will determine which species are proposed for the planting in specific areas include post-mining soil characteristics and topography. Areas within the permit boundary that will be reclaimed to commercial forest (by lease agreements) will be planted primarily in loblolly pine, the most important species in the area for timber production. Lease agreements reflect the landowners' preferences of postmining land use and vegetational community type. Future changes in land ownership and in the preferences of landowners and/or lessors may allow for the creation of additional fish and wildlife habitat in the permit area by interplanting with tree species such as oaks, hickories, and/or other wildlife vegetation. The most appropriate time for determining such preferences and for making modifications in lease requirements would be immediately prior to actual mining. The applicant will utilize wildlife habitat as the primary postmining land use for fee land to be mined. Table 4-4 lists species proposed for revegetation in the pastureland and fish and wildlife habitats.

4.4.5.3 Alternative Mitigation Measures

Alternative measures to alleviate or reduce losses of fish and wildlife habitat through proposed project activities include the following (* indicates measures to be taken by DHMV as a part of the fish and wildlife plan in the Surface Mining Permit Application):

1) Avoiding certain mining impacts altogether by not taking certain actions or parts of action and minimization of impacts on fish and wildlife habitat by limiting the degree or magnitude of mining activities.
   *a. Avoidance of approximately 1,620 hectares (4,000 acres) of wetlands within the original 20,655 hectare (51,000 acre) project area.
   *b. Avoidance of all 103 hectares (253 acres) of USCE-designated wetlands within the mine permit area.
   *c. Avoidance of some 1,527 hectares (3,770 acres) of bottomland hardwood forest within the original 20,655 hectare (51,000 acre) project area.
   d. Avoidance of all 732 hectares (1,807 acres) of bottomland hardwood forest within the mine permit area.
   *e. Minimization of the impact on bottomland hardwood forest within the mine permit area (317 hectares (783 acres) will be impacted).
   f. Avoid mining of all streams within the mine permit area.
2) Rectifying the impact by repairing, rehabilitating or restoring the affected environment.
   a. Restoration of all land affected by mining activities to pre-project land use.
   b. Restoration of all land affected by mining activities to fish and wildlife habitat.

*c. Restoration of riparian habitats.

d. Restoration of selected riparian habitats.

e. Restoration of selected streambeds (with riffles, pools, etc., where possible) in their original location after temporary diversion.

*f. Restoration of all streambeds (with riffles, pools, etc., where possible) in their original location after temporary diversion.

g. Creation of selected new streambeds with riffles, pools, etc., where possible in permanent diversions.

*h. Creation of all new streambeds with riffles, pools, etc., where possible in permanent diversions.

*i. Possible future restoration of leased land to fish and wildlife habitat, pending landowner agreements (lease requirements).

j. Restoration of future mine leases to fish and wildlife habitat where possible.

3) Reducing or eliminating the impact to fish and wildlife habitat over time by preservation and maintenance operation during the life of mining activities.

*a. Use of sedimentation ponds.

*b. Use of erosion control.

c. Conveyor design.

  *1. dust cover and dust suppressant

  *2. raised bottom/low height design to reduce barrier to potential to wildlife traversing the project site

  *3. crossings at transfer points and roads

  4. crossings at every 0.5 miles

  *5. belt flip over

d. Dust suppressant

  *1. watering

  *2. mulching

  *3. vegetation cover

*e. Mining sequence to delay adverse impacts to sensitive habitats (e.g. bottomland hardwood forests) in the mine permit area as long as possible.

*f. Use of approved bridges, culverts, etc. for stream crossings.

g. Use of fencing to divert wildlife away from hazardous areas and areas being revegetated.

*h. Monitoring of land reclamation and revegetation.

4) Compensating for the impact on fish and wildlife habitat by replacing or providing substitute resources or environments.

- *a. Establishment of fish and wildlife habitat as primary postmining land use of fee land to be mined.
- *b. Restoration of aquatic habitats (e.g., riffles, pools, etc.) in relocated streams.
- *c. Creation of new ponds and related aquatic habitat.
- *d. Establishment of fish and wildlife habitat along rights-of-way.
- e. Provisions for open areas (at least 0.5 acre) in reclaimed forest planted in grasses and legumes.
- f. Provide clump plantings of shrubs and conifers in open pasture.
- g. Provide shrub strips (not more than 20 feet in width) around reclaimed pastures.
- *h. Provide more edge habitat than currently available.

4.5 ALTERNATIVES AVAILABLE TO EPA

Three alternatives are available to EPA regarding its permit action. These are: (1) issue the NPDES permit as proposed; (2) issue the NPDES permit with certain conditions; or (3) deny the NPDES permit. The issuance of the NPDES permit as proposed would allow DHMV to construct and operate the surface lignite mine as described in Section 4.4 and to discharge wastewater to the limits set forth in the permit. However, EPA may determine that special conditions should be added to the NPDES permit where necessary to minimize or avoid adverse environmental impacts. EPA may deny the NPDES permit if certain environmental considerations are significantly adversely impacted and mitigation measures are unacceptable. These considerations include violations of water quality standards, significant impacts on the human environment, endangered species, cultural resources, wetlands, floodplains and prime farmlands. Denial of the NPDES permit by EPA could cause DHMV to redesign the project for no effluent discharge or pursue the no action alternative.

4.6 ALTERNATIVES AVAILABLE TO OTHER PERMITTING AGENCIES

4.6.1 U.S. Army Corps of Engineers

TABLE 4-4

REPRESENTATIVE VEGETATION SPECIES TO BE USED IN THE DOLET HILLS LIGNITE MINE RECLAMATION PLAN (EXCLUDING COMMERCIAL FOREST SPECIES[1])

Species	Planting Dates	Seeding Rate (lbs/ac)
Temporary and Permanent Herbaceous Species for Pastureland:		
Alicia bermudagrass (*Cynodon* sp.)	Apr - Aug	35 (bu/ac)[2]
Common bermudagrass (*Cynodon dactylon*)	Apr - Jun	10
Crimson clover (*Trifolium incarnatum*)	Sep - Dec	15
Bahiagrass (*Paspalum notatum*)	Sep - Jul	25
Annual ryegrass (*Lolium multiflorum*)	Sep - Dec	25-40
Winter wheat (*Triticum vulgare*)	Sep - Nov	75
Switch grass (*Panicum virgatum*)	Mar - Jun	5
Subterranean clover (*Trifolium subterraneum*)	Aug - Nov	20
Reed canarygrass (*Phalaris arundinacea*)	Apr - Jul	5
Yuchi arrowleaf clover (*Trifolium* sp.)	Sep - Dec	10
Carpetgrass (*Axonopus affinis*)	Sep - Mar	15
Lespedeza (*Lespedeza* spp.)	Jan - Mar	25-40
Coastal bermudagrass (*Cynodon dactylon*)	Mar - Jun	35 (bu/ac)[2]
Sorghum - sudan grass hybrids (*Sorghum* spp.)	Apr - Jul	20
White clover (*Trifolium repens*)	Sep - Dec	5
Millet (*Setaria* sp.)	Apr - Aug	25

TABLE 4-4 (Concluded)

Species	Planting Dates	Spacing (ft)	Trees/Acre
Woody Species for Fish and Wildlife Habitat			
Blackberry (*Rubus* sp.)	Dec - Mar	8 x 8	150
Wax myrtle (*Myrica cerifera*)	Dec - Mar	8 x 8	20
Fringe tree (*Chionanthus virginica*)	Dec - Mar	10 x 10	20
Flowering dogwood	Dec - Mar	8 x 8	75
Holly	Dec - Mar	1 x 3	30
Greenbriar	Dec - Mar	1 x 3	30
Wild grapes	Dec - Mar	1 x 3	30
Tree Species for Fish and Wildlife Habitat Subject to Occasional Flooding:			
Green ash	Dec - Mar	10 x 10	75
Water oak	Dec - Mar	10 x 10	75
Nuttall oak (*Quercus nuttallii*)	Dec - Mar	10 x 10	75
Shumard oak (*Quercus shumardii*)	Dec - Mar	10 x 10	75
Bald cypress (*Taxodium distichum*)	Dec - Mar	10 x 10	75
Cottonwood	Dec - Mar	10 x 10	75

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[1] According to lease agreements, commercial forests will be planted in pine only.

[2] Sprigging rate.

5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

This section presents an assessment of potential impacts associated with the Dolet Hills Lignite Mine Project. For purposes of discussion, the 11,968 hectares (29,573 acres) that will encompass the mining blocks; the ancillary facilities such as the main office, field offices, haul roads, etc.; and any associated ancillary activity hectarage that may potentially be affected during the life of the mine is defined as the permit area. Construction impacts are those associated with clearing, levelling, and building of ancillary facilities necessary for mine operation. Clearing, mining, and reclamation activities of the mining blocks are assessed as operations impacts.

5.1 EARTH RESOURCES

5.1.1 Topography

5.1.1.1 Existing Environment

The Dolet Hills permit area is situated within the West Coastal Plain physiographic province. Three major land forms are notable within the area: low-lying alluvial valleys, alluvial terraces, and rolling uplands. Land elevations within the permit area range from a low of approximately 36.5 meters (120 feet) above mean sea level (msl) occurring along the floodplain of Dead Negro Branch in the southeastern portion of the permit area, to a high near 118.8 meters (390 feet) msl occurring in the uplands of the central portion of the permit area (see Figures 5-3a and b in Section 5.2.2.1 for topographic relief).

5.1.1.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of construction and operation related to the Dolet Hills Lignite Mine Project.

The future without the project includes the continuation of gravel mining in the permit area and lignite development that is occurring in the vicinity of the project. Further development within the proposed permit area could adversely impact topography.

5.1.1.3 Construction Impacts

There exists the possibility of important paleontological resources (i.e., vertebrate fossils) in the Wilcox formations to be mined; however there are no known unique fossil recoveries in the region. Most fossils found in the Naborton or Dolet Hills are only of local importance, serving as marker beds for formation changes, and are not necessarily unique in nature.

Oil and gas are the major mineral commodities being obtained from the region, and there are several producing fields within or immediately adjacent to the permit area. A recent inventory of Louisiana Department of Conservation records indicated that there are approximately 60 producing oil and gas wells within the permit area, and there are also several abandoned wells and pipelines within the area. Production has declined over the past 20 years, and current rates are an average 10 barrels per day per well (Porter, 1980).

Lignite is present throughout northern Louisiana in recoverable quantities. A recent study by Roland, et al. (1976), the first comprehensive report concerning lignite reserves in Louisiana, conservatively estimates the extent and volume of lignite reserves in De Soto Parish at 546 million tons. There is no commercial lignite production taking place at this time, however, in the vicinity.

There are presently two sources of gravel in the vicinity of the proposed project. Silica gravel composed of quartz, chert, and other silicate minerals is being mined from isolated sites within the alluvium and terrace deposits along the Red River. Ironstone gravel, principally hematite, has been mined within the permit area for use as road base material.

5.1.2.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of mining operations related to the Dolet Hills Lignite Mine Project.

The future without the project will be that mining of iron-ore gravel in the permit area will continue to adversely impact geologic resources. Future lignite development would have an adverse and irretrievable effect on that natural resource.

5.1.2.3 Construction Impacts

Construction activities in the mine area will be limited principally to the construction of

Permian "red beds" of Oklahoma and Texas and were deposited by the Red River. These are young, relatively unweathered soils. Surface and subsurface layers are mostly clay. These soils are less acidic than others within the permit area. They are productive, especially for soybeans and pasture, where protected from flooding and where an adequate drainage system has been installed. However, most of these soils are not protected from flooding and are primarily in bottomland hardwood forests.

Prime Farmland. Figure 5-1(a and b) shows the distribution within the permit area of prime farmland as defined by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) in Section 657.5(a) of CFR 43, No. 21, dated Tuesday, January 31, 1978. Table 5-2 shows which soil map units qualify as prime farmland under the SCS criteria and the acreages and proportions involved.

Approximately 3,013 hectares (7,444 acres, or 25.2 percent) within the permit area qualify as prime farmland under SCS criteria. Of this, 3,007 hectares (7,431 acres, or 25.1 percent of the permit area) is on uplands, primarily in the western part, most of which is mapped as Bowie fine sandy loam, one to five percent slopes. Because of flooding, none of the bottomland soils along local streams qualify as SCS prime farmland. Only 5.3 hectares (13 acres, or 0.1 percent of the permit area) of Red River bottomland soils qualify as prime farmland under SCS criteria.

In Louisiana, the definition of prime farmland for surface mine permitting purposes is contained in the Louisiana Surface Mining Regulations (LSMR) 100.5(78). A historical land-use survey, based on LSMR criteria, was conducted in 1981 and revised in 1983 on all lands defined as prime farmland by the SCS within the permit boundary (Allison, 1981 (revised)). The survey showed that approximately 91.9 hectares (227 acres, or 0.8 percent of the permit area), located primarily on a dairy farm, qualified as prime farmland.

Soil Capability Groups. The SCS uses a land capability classification system to rate soils for determining, in a general way, how suitable they are for most kinds of farming. The system is based primarily on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. In this system, soils are grouped at three levels: the capability class, subclass, and unit.

The capability classes are designated by Roman numerals I through VIII. In Class I are soils that have few limitations, the widest range of use, and the least risk of damage when such minerals are mobilized by the oxidation of high acid-bearing materials, with subsequent concentration in runoff waters (Smith and Sobek, 1978).

5.1.3.2 Effects of No Action

The no action alternative would eliminate the adverse impact of construction and operations related to the proposed project.

The future of the project site without the project will depend to a large extent on future land use and management. For several decades, land-use trends on upland soils in north Louisiana have seen a reduction in cropland, with a corresponding increase in improved pastures and timber production. Accelerated erosion under these uses should be minimized, although erosion will continue where vegetative cover is sparse. Small areas along bottomlands of local streams and bottomlands of the Red River, if drained and protected from flooding, would change from nonprime to prime farmland. Large-scale practices of this nature are highly unlikely because of the expense involved versus monetary returns.

Although not a surface mining impact, it should be noted that ongoing extensive urban development in Caddo and Bossier parishes is accounting for the loss of large portions of prime farmland in the region; urban expansion is a leading cause of the loss of prime farmland (Ramsey and Corty, 1982).

5.1.3.3 Construction Impacts

Land clearing prior to construction of mine facilities within the mine ancillary activity area will create short-term adverse impacts associated with accelerated erosion, particularly on soils with steep slopes. Appropriate mitigative measures, such as reseeding disturbed areas after construction, will be employed to lessen this adverse effect. Conversion of soils from agriculture and developed forestry (approximately 0.9 hectares (2.2 acres) and 4.9 hectares (12.1 acres), respectively) to mine facilities (industrial) use is an unavoidable adverse impact for the life of the proposed mine, resulting in a commitment of these resources. Once the project is completed, facilities within the ancillary activities area will be dismantled, and the land will be reclaimed according to landowner preference.

There should be no short-term adverse impacts to surface layers due to surface crusting or localized acidity. The soils should have a productivity capacity equal to that of the existing soils.

No Selective Placement. Overburden data indicates that a random overburden mix without selectivity would create soils somewhat heterogeneous in nature. This is due to the wide range in properties (particularly texture and potential acidity) of layers within the overburden. The average soil will be less sandy than where the preferred alternative is used. Surface crusting and low organic matter and microbial content will have short-term, reversible adverse impacts, in effect until vegetation is reestablished. Due to incomplete mixing, small and localized areas of highly acidic materials would offer short-term, adverse effects which could inhibit plant growth in localized areas. Following correction of these areas by liming, removal and reburying, and/or topsoiling, the reconstructed soil should have a favorable balance of chemical and physical properties. Production for most agricultural uses should equal that of existing soils.

In summary, productivity and postmined soils by any of the alternatives discussed can be equal to that of existing soils, provided excessively sandy materials (USDA textures of sand and loamy sand) are avoided. Even these soils can have good forest productivity, but future use for cultivated crops and pastures would be limited.

Prime Farmland. As discussed earlier, prime farmland soils, using SCS criteria (Table 5-2), exist on about 3,013 hectares (7,444 acres, or about 25 percent) of the mine permit area. SCS prime farmland will be directly and adversely impacted only where it is present in the mined blocks and construction sites in the ancillary area. In the total permit area, about 91.9 hectares (227 acres) has a land use history that qualifies as prime farmland under Louisiana Surface Mining Regulations (Allison, 1981 (revised)).

Selective Placement of Materials (DHMV's Preferred Alternative). The reconstructed soils would no longer have the characteristics of existing soils. Use of the preferred alternative (replacing existing soils with selected sandy layers of unoxidized overburden material) would create soils sandier than now exists on prime farmland areas, particularly within the subsoil. Short-term impacts would be similar to those described earlier. Forestry production should be equal to that of existing prime farmland soils, but the sandy nature of the reconstructed soil may limit the productive capacity for cultivated crops and pasture. Reconstructed soils having textures of loamy fine sand or sand would

Combined operational impacts will involve the adverse impact of conversion of soils from agricultural (136.5 hectares or 337.2 acres) and forestry (301.7 hectares or 745.5 acres) uses to plant site, transportive systems, and ancillary mine facilities (industrial use). This conversion will last for the life of the project (32-35 years). The main operational impact, however, will involve a potential for short-term accelerated erosion between the time land is cleared for overburden removal and prior to revegetation following postmine grading and vegetative reclamation.

No prime farmland is involved on the plant site. Relatively small acreages will be involved where the blowdown discharge pipeline and the railroad cross soils of the Red River bottomlands east of the mine site (EPA, 1981).

Approximately 3,013 hectares (7,444 acres) within the mine permit area are designated as prime farmland under Soil Conservation Service (SCS) criteria. These presently designated prime farmlands will be irretrievably lost within the mined area and ancillary construction area, and may be adversely affected in the remaining ancillary area.

About 91.9 hectares (227 acres) have a land-use history that qualifies it as prime farmland under Louisiana Surface Mining Regulations. While all mined land must be restored to equal or better use, LOCSMD regulations require that the prime farmland designated under land-use history be replaced with the original topsoil after mining. DHMV will segregate, stockpile, and replace topsoil that is designated historical prime farmland.

5.2 WATER RESOURCES

5.2.1 Ground Water

5.2.1.1 Existing Environment

Ground water within the permit area and vicinity exists within four geohydrologic units in variable quantities and quality. These units are the Naborton, Dolet Hills, and Cow Bayou formations of the Wilcox Group; and the Quaternary alluvium and terrace deposits associated with the Red River and its tributaries. A water well inventory was conducted and information was compiled from records of the Louisiana Department of Water Works, the U.S. Geological Survey (USGS), and Espey, Huston & Associates, Inc. (EH&A, 1980a). Approximately 120 ground-water wells were located adjacent to the permit area and

The results of the aquifer testing program indicate ranges of transmissivities in the Dolet Hills from 79 to 826 gpd/ft, averaging 534 gpd/ft; and a range from 29 to 602 gpd/ft in the Naborton, with an average 302 gpd/ft. Permeabilities in the Dolet Hills ranged from 5.5 to 54 gpd/ft^2, averaging 34 gpd/ft^2; and in the Naborton ranged from 1 to 24 gpd/ft^2, with an average of 15 gpd/ft^2.

5.2.1.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of construction and operation related to the proposed project.

Expected normal ground-water use and demand would be continued in the future without the project. Lignite development in the region is occurring and potential future lignite mining in the project area could adversely impact ground-water resources.

5.2.1.3 Construction Impacts

Mine construction activities primarily include the construction of haul roads and the conveyor system, dragline erection pads, and shop and office facilities. These activities will result in the disturbance of surface and shallow subsurface material over approximately three percent of the project area, but will not result in adverse impacts to the ground-water quantity or quality of the region.

5.2.1.4 Operation Impacts

The discussion of impacts to ground water resulting from mining operations is primarily directed towards the postmine usage of the ground-water supply as a resource. As previously discussed, the water-bearing formation above the mineable lignite, the Dolet Hills Formation, will be permanently altered geologically from its premining characteristics. In addition, the hydrologic characteristics of the formation will also be altered in terms of the nature of ground-water flow through the unit. Mixing the highly transmissive sand zones, where most ground-water flow occurs, with the lower permeability silty and clayey zones, will inhibit horizontal ground-water flow which may primarily impact the post-mine rate of recharge. Once the cast overburden becomes resaturated after mining is completed, the average potential yield of the unit should be similar to pre-mining yields.

quality monitoring program, including tabulated results for all constituents analyzed and discussions for each monitoring site, are included in the report, "Steady-State Water Quality of the Dolet Hills Project" (SWEPCO, 1981).

5.2.2.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of construction and operation related to the proposed Dolet Hills Lignite Mine Project.

In the absence of the project, the future surface water regime of the project area should remain essentially unchanged from existing conditions, barring the possibility that other independent development may occur in the vicinity.

5.2.2.3 Construction Impacts

Hydrologic Conditions. Activities related to mine construction will result in some short-term impacts on the surface water hydrologic regime on and adjacent to the mine site. Excavation and grading activities associated with the construction of overland flow diversion facilities, sedimentation ponds, and other erosion control measures to be implemented prior to mining, in accordance with LDNR surface mining regulations, will alter existing drainage patterns, overland runoff volumes, peak runoff rates, and sediment loadings. Also affecting the hydrologic characteristics of the site will be other activities associated with development of the mine facility, including timber and brush clearing, road relocation and construction, pipeline relocation, construction of stream diversions, and site preparation and construction of shop facilities. These operations will result in temporary reductions of streamflow in some localized areas (e.g., below stream diversions), while runoff will increase at other locations such as temporarily denuded areas and streams receiving diverted runoff from other areas. Channelization of overland flow at construction sites will also tend to increase localized peak runoff rates in the affected areas. Construction impacts on runoff characteristics will be of short-term duration, essentially ceasing upon the completion of the facilities and revegetation of the affected areas. The stream reroutes planned will generally consist of diversions into parallel channels to allow the recovery of lignite in the original channel locations. Approximately 15.9 kilometers (9.9 miles) of streams within the permit area will be temporarily diverted; another approximately 10.8 kilometers (6.7 miles) will be permanently diverted. Approximately 4.5 kilometers (2.8 miles) of these diverted streams will be constructed outside the unimpeded until the parallel diversion is constructed. Existing streams will be temporarily and adversely affected by runoff and increased sediment loading during construction. After completion of a temporary stream diversion, flow will be directed to the new channel and the existing streambed will be mined, thus resulting in the direct adverse impact of total removal. Once the overburden has been replaced, the streambed will be replaced and flow from the diversion will be directed back to the site of the original streambed. Permanent diversion activities will be conducted in the same manner except that the original streambed will not be replaced and thus will be adversely affected in the long term. However, the parallel diversion will accommodate all watershed runoff that previously flowed through the original stream. As these diversions will be very localized, long-term effects on downstream flows are not anticipated. An exception is Tenmile Bayou, which will be diverted from the Sabine River Basin into the Red River Basin for approximately two years and then permanently rediverted back to the Sabine Basin. Current technology will be employed, as necessary, to minimize the potential adverse effects of mine construction on runoff (e.g., riprap, energy dissipators, etc.).

Water Quality. Mine development will require construction activities that will have some short-term effects on the surface water quality within and adjacent to the mine site. Activities such as road relocations and construction and site preparation will cause some increases in sediment production. In addition, excavation and grading work in connection with the construction of overland flow diversion facilities and sedimentation ponds is expected to result in short-term increases in sediment production. Areas in which only diversion ditches, sedimentation ponds, or roads are installed prior to mining activities are not subject to compliance with effluent limitations for runoff from disturbed areas. The overall adverse effects of mine-related construction activities on the surface water quality of the area should be minor in magnitude and of short-term duration. Sediment control measures such as mulches, straw dikes, vegetative filters, and detention basins will be implemented, as necessary, to minimize sediment production during the construction phase.

present may occur, resulting in adverse impacts on runoff water quality. Therefore, although the overburden geochemistry data do not indicate major or widespread instances of adverse water quality impacts, some isolated instances of adverse impacts related to acidity and mobilization of toxic substances are expected to occur in localized areas within the mine area that drain to sedimentation ponds. Compliance with the applicable permit monitoring and reporting requirements for LDNR will provide the means for identifying excessive toxic constituent levels in the effluents, at which time appropriate mitigative action will be taken, if necessary.

Other effluent streams to be generated by the mining activities will include seepage into the active pits, direct rainfall into the active pits, domestic sewage, and vehicle washwaters. Pit seepage and rainfall on the pit areas will be collected in sumps, pumped to collection ponds, treated as necessary, and discharged to appropriate receiving streams. Due to the large areal extent and multiple-pit mining operations, various watercourses will serve as receiving streams for the pit dewatering effluents during the life of the project. The general area to be covered by the NPDES permit is that area to be disturbed during the first 5 years of construction and operation. Figure 4-7a and b shows the locations of sedimentation ponds described in the draft permit (Appendix A). Most are concentrated in the eastern portion of the permit area. Two ponds are located in the northwestern portion, near the main office. All the ponds must comply with limitations for pH, TSS, iron and manganese, and discharges into two of the ponds (001V and 001J) must also comply with more stringent limitations for TSS, and with BOD limitations. The outfalls of these sedimentation ponds will be monitored as indicated in the draft permit (Appendix A). Approximately 8,516 liters (2,250 gallons) per day of domestic sewage will be treated in oxidation lagoons and discharged to nearby sedimentation ponds. Vehicle washwaters will be treated as necessary (e.g., oil skimmer) and discharged to sedimentation ponds. Berms will be constructed around fuel supply tanks at the main and field offices to control spillage. In general, as all wastewater sources associated with the mine will be subject to NPDES permit requirements and compliance with applicable water-quality standards, adverse water-quality impacts are expected to be minor.

Under the selective placement alternative, no significant adverse impacts to surface water quality are anticipated, although there exists the possibility that toxic substances could occur on the surface and create surface water quality problems. However, such

5.3.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of construction and operation related to the Dolet Hills Lignite Mine Project; however, impacts resulting from the Dolet Hills Power Plant would still be incurred.

With the possible exception of future construction and operation of other nearby facilities proposing to emit large quantities of TSP, the future of the project area's air quality will remain unchanged from its present condition if the proposed project is not constructed. If new industrial development occurs in the project area, the TSP standards could become constrained at some future date. Such future sources would be limited by Federal and State agencies so as to not cause exceedances of the standards or violate any other existing or future air pollutant regulation.

5.3.3 Construction Impacts

Fugitive particulate emissions from mine site preparation and ancillary facilities construction will cause some adverse air quality impacts in areas immediately surrounding construction activities. These impacts will be short-term and localized, and air quality levels will only occasionally exceed those resulting from normal rural agricultural, timber felling, or quarry activities. Since these emissions are construction-related they are exempt from air quality impact analyses for PSD purposes.

Land clearing will be carried out as necessary prior to overburden removal and mining operations. Merchantable timber will be felled and removed. The remaining vegetation and refuse will be dozed into piles or windrows and disposed of or burned according to LDNR regulations. Burning operations will be designed to minimize adverse impacts on surrounding areas and wildlife habitats.

Some smoke may be produced by the operation of diesel engines and by other construction activities such as welding. Vehicular exhaust emissions may include small amounts of carbon monoxide, hydrocarbons, and oxides of nitrogen. These mobile source emissions are not expected to produce any exceedances of Federal or State air quality standards.

Fugitive dust will be produced on-site by heavy earth-moving equipment involved in moisture content of the overburden and lignite. At the present time, no studies have been conducted which assess fugitive emissions from Gulf Coast lignite mines. Fugitive emission assessments conducted at western surface mines are considered to be inapplicable to the Dolet Hills Lignite Mine because of differences in climatological, geological, and soil characteristics. The fugitive emissions were exempt from PSD review (Divita, 1981; see letter of exemption at end of Section 6.0).

Some of the supplemental control measures used to mitigate the impact of fugitive dust emissions will include: application of water sprays on haul roads and service roads, rapid revegetation of all disturbed areas, and minimization of dumping heights.

5.3.4.3 Impact of Radioactive Emissions

Trace amounts of uranium and thorium are present in the Dolet Hills lignite, primarily as uranium-238 (U-238) and thorium-232 (Th-232), respectively, along with some 28 decay series' products. Typical values of U-238 and Th-232 measured in the Dolet Hills lignite are 1.25 and 2.18 parts per million by weight (ppm_w), respectively (Paul Wier Co., 1981).

Radon Emissions from Mining Operations

Radon-222 (Rn-222), a decay series radionuclide of U-238, will be released into the atmosphere as a result of mining operations at the proposed Dolet Hills Lignite Mine Project. Radon 222 is normally emanated continuously from virgin undisturbed topsoil. The amount of Rn-222 emanated is related to the amount of U-238 present in the soil or the near-surface material being evaluated. The emanation rate is also related to the type and form of material. The radon emanation ratio (ratio of escape to production rate) is approximately 15 percent for coal and up to 70 percent for soils (Beck et al., 1980). Other factors which influence the radon emanation rate of materials are moisture content (higher moisture contents reduce emanation) and porosity (the greater the porosity, the more easily radon released at greater depths can reach the surface and be emanated). Soils have been reported to have an average concentration of U-238 of 1.8 ppm_w (NCRP, 1975). The emanation rate of Rn-222 resulting from exposure of lignite seams during mining operations and storage of lignite at an emanation ratio of 15 percent would not be expected to be greatly different than from average soils at an emanation ratio of 70 percent. Therefore, release of Rn-222 by the exposed lignite during mining operations is not expected to be significant and would have negligible public health consequences.

Dolet Hills Lignite Mine Project. As directed by Congress in the Noise Control Act of 1972 and amended by the Quiet Communities Act of 1978, EPA has developed appropriate noise level guidelines. The equivalent sound level (L_{eq}) is the A-weighted sound level that is "equivalent" to an actual time varying sound level, in the sense that it has the same total energy for the duration of the sound. Outdoor L_{eq}'s in excess of 55 dBA for 24 hours are considered annoying for some persons, while levels of 70 dBA or more for 24 hours can result in hearing loss (EPA, 1974). The day-night sound level (L_{dn}) is the 24-hour equivalent sound level with the nighttime (10:00 p.m. to 7:00 a.m.) sound level penalized by the addition of 10 dBA. EPA generally recognizes rural areas to have an average L_{dn} of less than 50 dBA (EPA, 1978b). EPA has also developed guidelines for a short-term goal L_{dn} of 65 dBA and a long-term goal L_{dn} of 55 dBA for noise levels outside of structures such as buildings, residences, etc. (EPA, 1977b). For residences, the U.S. Department of Housing and Urban Development (HUD) considers outdoor L_{dn}'s of 65 dBA or less to be "acceptable". L_{dn}'s above 65 dBA and not exceeding 75 dBA are considered "normally unacceptable", and levels above 75 dBA are "unacceptable" (HUD, 1980).

5.4.1 Existing Environment

The Dolet Hills Lignite Mine Project area can best be classified as a rural environment. The major noise sources in the vicinity of the permit area are spread over an area in excess of 194.2 square kilometer (75 square miles) and represent general activities from a major population center, Mansfield, and motor vehicle noise associated with U.S. 84 and LA highways 175, 177, 346, 510, and 522. Representative noise levels were computed for each source using currently accepted techniques for determining community and traffic noise. Noise levels associated with oil and gas well operations were not considered due to their insignificant contribution to the overall project area background sound level. Noise levels from timber removal operations can be significant at times, however, due to the transient nature of the activities, contributions to the noise level due to timber removal were not considered in the assessment of the existing environment. There are no major airports or railroads within 3.2 kilometers (2 miles) of the permit area.

L_{dn}'s for communities can be computed (National Research Council, 1977) using the equation: $L_{dn} = 10 \log \rho + 22$ dB, where ρ is the population density in people per square mile. The calculated L_{dn} for Mansfield was found to be 52 dBA, which is within the HUD acceptability limit of 55 dBA for residential areas.

No noise measurement data were available for pertinent sections of the roadways near the permit area, so traffic characteristics and accepted methods of motor vehicle noise prediction were employed to estimate traffic noise. Motor vehicle noise was quantified using the Federal Highway Administration (FHWA) Noise Predictor Model, SNAP 1.0, and was based upon Louisiana Department of Transportation average 24-hour traffic data. SNAP 1.0 results show traffic noise to be less than 55 dBA beyond 243.8 m (800 feet) of all the roadways in the permit area.

To adequately describe the existing sound quality, noise levels have been estimated for locations around the proposed permit area. The previously discussed noise sources are typical of the permit area, but due to the area's rural nature, any specific point is usually affected by only one or two of the noise sources mentioned. Using hemispherical radiation analysis techniques, L_{dn}'s have been projected to 16 baseline sensitive receptor locations, comprising 15 churches and the Mansfield Battle Park. All are located within 1.6 kilometers (1 mile) of the permit area boundaries. Levels were found to range from 40 to 60 dBA at the baseline receptor locations.

In summary, permit area L_{dn}'s were found to range between approximately 35 dBA in purely rural areas to as high as 60 dBA in those areas heavily influenced by motor vehicle traffic. The major portion of the permit area has an existing ambient noise level varying between 45 and 50 dBA.

5.4.2 Effects of No Action

The no action alternative would eliminate the adverse impact of construction and operations related to the Dolet Hills Lignite Mine Project.

The future without the project may include higher traffic volumes on US 84 and LA 175 in association with general population growth in the area that could increase highway traffic noise levels. Otherwise, little or no change in the permit area's baseline ambient sound level is anticipated in the future without the project.

5.4.3 Construction Impacts

Noise-producing construction activities at the proposed Dolet Hills Mine Facility can be categorized into two basic activities: (1) ancillary facilities construction (i.e., field work-flooding. A portion of the bottomland forest described in this section was delineated as wetlands by the USCE.

Dominant overstory species in bottomland mixed hardwood forest within the permit area include sweetgum, sugarberry, water oak, American hornbeam (*Carpinus caroliniana*), loblolly pine, and boxelder (*Acer negundo*). Bottomland understories predominantly consist of red maple, water oak, American hornbeam, sweetgum, and various elms. The shrub layer of bottomland forests include shrub species such as American beautyberry (*Callicarpa americana*), giant cane (*Arundinaria gigantea*), witch-hazel (*Hamamelis virginiana*), and flowering dogwood (*Cornus florida*), along with tree seedlings of red maple, sugar maple (*Acer saccharum*), sassafras (*Sassafras albidum*), and American holly (*Ilex opaca*). The ground cover consists of herbaceous species such as May-apple (*Podophyllum peltatum*), Japanese honeysuckle (*Lonicera japonica*), green dragon (*Arisaema dracontium*), Carolina elephant's-foot (*Elephantopus carolinianus*), and various violets (*Viola* spp.). All of the bottomlands within the permit area have been highgraded; i.e., marketable hardwoods have been removed (Allison, 1983).

Hydric Habitats. Hydric habitats within the mine permit area include permanently or semipermanently inundated or saturated swamps, marshes, and bogs. Of these, permanently or semipermanently inundated or saturated swamps are most common in the permit area. Two large swamp complexes, Chemard Lake and Dolet Brake, lie immediately to the east of the mine permit area. The relatively minor swamp known as Louies Brake and small portions of Dolet Brake and Sample Brake, however, comprise practically all the hydric habitats, as defined above, within the permit area. This swamp acreage is included in the areas (approximately 102.3 hectares or 253 acres) delineated as wetlands under the jurisdiction of the USCE on the east boundary of the permit area (see Section 6.2.1 and Figure 4-6b). In Louies Brake, bald cypress, some with diameters of over 180 cm (71 inches), form scattered near-monocultures within the swamp. However, stands dominated by overcup oak are more representative of the limited swamp acreage in the permit area. Important subdominants in overcup oak swamps include bald cypress, sugarberry, water locust (*Gleditsia aquatica*), water-elm (*Planera aquatica*), willow oak, and common buttonbush. The understory in overcup oak swamps typically consists almost entirely of swamp privet (*Foresteria acuminata*). Duckweed (*Lemna minor*) and water fern (*Azolla caroliniana*) are locally abundant, but herbaceous species are otherwise lacking, except for sedges (*Carex* spp. and *Cyperus* spp.), rushes (*Juncus* spp.), and wapato (*Sagittaria latifolia*) along the banks.

consist of abandoned croplands and pastures dominated by broomsedge (Andropogon virginicus) and being invaded by shrubs and trees, particularly loblolly pine, sweetgum, pasture haw (Crataegus spathulata), and common persimmon. Tame pastures dominated by bermuda grasses or bahia grass (Paspalum notatum) occur throughout the permit area. These pastures are used for both cattle-grazing and hay-cutting. The very limited acreage devoted to croplands within the permit area is included under the "grassland" vegetational type. Although these croplands are mainly small domestic gardens, a few acres of row crops (watermelons, soybeans, cotton, or corn) and pecan orchards exist.

Important Species. "Important" species are defined as those that (a) are commercially or recreationally valuable, (b) are threatened or endangered, (c) affect the well-being of some important species within criteria (a) or (b), or (d) are critical to the structure and function of the ecological system or are biological indicators.

Threatened and Endangered Species. No Louisiana plant species are listed or proposed by the FWS as threatened or endangered (45 FR (242):82480-82569). Information concerning rare and endangered species has recently been updated by the FWS. Eight plant species that are of potential occurrence in the permit area are listed by the FWS, as "under review." Three of these species are also listed by the Louisiana Forestry Commission (1977) as rare. Table 4-17 in the Draft EIS for the proposed power plant (EPA, 1981) presents scientific names, common names, distributions, and status categories for these species. None of these species were observed nor are known to occur in the proposed Dolet Hills mine permit area.

Other Important Species. The most commercially important plant species in the permit area are the loblolly and shortleaf pines occurring both in uneven-aged pine/hardwood stands and even-aged pine plantations as discussed above. Marketable hardwoods in the permit area have been removed from the areas of bottomland hardwood forests at one time or another (Allison, 1983). Common and coastal bermuda grass and bahia grass are the most important forage species planted in the pastures within the permit area. Domestic gardens and row crops (chiefly watermelons and corn) are of limited importance. The economic value of these commercially important plant species is discussed in Section 5.8.4.

Dominant species are, by definition, critical to the structure and function of the ecological system and, therefore, qualify as important species under criterion (d). The interest because of the importance of beech in the theoretical climax forest of the Gulf Coastal Plain.

Hydric habitats (i.e., swamps, marshes, bogs, and other hydric habitats) and bottomland hardwood forests in the permit area would be considered ecologically sensitive due to their high productivity, their dependence upon certain hydrologic factors, and their high susceptibility to potential project impacts such as sedimentation. Approximately 102.3 hectares (253 acres), including Louies Brake in the eastern portion of the permit area, comprise the most sensitive portions of these two vegetational communities due to their delineation as wetlands under the jurisdiction of the USCE (see Section 6.2.1).

Portions of both the mesic cove and bottomland forest types in the permit area contain plant species that Kral (1966) views as indicators of a Pleistocene relict flora uncommon in Louisiana. In addition, many of the 191 species of vascular plants associated with the mesic slope and bog forests were not associated with other plant communities on the permit area.

5.5.1.2 Effects of No Action

The no-action alternative would eliminate the adverse impacts of construction and operation related to the proposed Dolet Hills Lignite Mine Project.

In the absence of the project, future changes in the terrestrial vegetation could be expected if current trends continue. In many portions of the lignite belt in northwestern Louisiana, both upland and bottomland forest and shrub communities are being converted either to managed pine forest/plantation or pastureland or row cropland. Plant successional patterns are being complicated by the introduction of grasses and legumes for improved pastures. These ongoing adverse impacts to terrestrial vegetation generally result in reduced plant species diversity and less native, natural vegetation.

5.5.1.3 Construction Impacts

Site preparation and construction activities within the proposed permit area will adversely impact those portions of the ancillary area where offices, roads, dragline erection pads, surface water control structures, powerlines, service structures, and the various pipeline and highway relocations will be constructed.

2008. Approximately 102.3 hectares (253 acres) of delineated wetlands under the jurisdiction of the USCE occur in the permit area. None will be directly impacted by mining operations; however, there may be indirect adverse impacts to these and adjacent wetlands as a result of dewatering and ancillary activities.

Since sedimentation is potentially the most adverse impact to offsite areas of clearing activities, erosion will be minimized by locating commonly accepted structures as close to the sediment source as possible prior to the initiation of clearing and grubbing operations. Erosion control structures will include stream diversions, sedimentation ponds, hay-bale barriers, catchment basins, and overland flow-interceptor channels. As described below in the discussion of reclamation plans, erosion and associated adverse impacts on down stream plant communities will be further minimized by the establishment of a vegetative cover on areas disturbed by clearing as soon as feasible. During mining operations, the adverse impacts of sedimentation on surface- and ground-water regimes in adjacent floodplains due to the ongoing construction of surface water control structures will be periodic and short-term; therefore, water-related adverse impacts to vegetation in the floodplains adjacent to the mine area due to the construction of such structures should be minor.

The mining activity of men and machinery, along with associated dust, will have unavoidable minor, adverse impacts on immediately adjacent terrestrial vegetation in the project area. Land clearing, mining operations, and traffic will create wind-blown particulates of both soil and lignite, which will accumulate to some extent on foliage surfaces in areas immediately adjacent to these activities. However, these unavoidable adverse impacts should be short-term and localized because the total amount of area affected at any time will be relatively small. Road surfaces will be sprayed with water as needed and reclamation will immediately follow mining.

Projected operational changes to the topography within proposed mine areas (i.e., smoothing of existing surface features and slight increase in surface elevation), in addition to devegetating those areas, tend to increase surface runoff velocity from the slopes into adjacent bottomlands, causing increased erosion and sedimentation. Proper use of erosion control structures will prevent increased sedimentation in the bottomlands in the mine area, which, if not prevented, could result in the desiccation of existing hydric habitats because of increased elevations in those areas. The operation of surface water control structures, however, may result in a reduction of water inflow to forested and vegetation following establishment. In addition to the control structures described previously, erosion control prior to the establishment of a permanent vegetative cover will include temporary cover crops and mulching. Vegetation establishment will be aided by use of equipment (e.g., hydroseeders) which can apply seed, mulch, binder, and amendments in the same operation, or by using other acceptable equipment. Adverse impacts to terrestrial vegetation during reclamation activities may result from earth moving, use and removal of haul roads, application of lime and fertilizers, seeding, and planting of trees. The short-term effects arising from these operations would include increased fugitive dust emission and downstream water degradation.

The temporal nature of postmining habitat restoration will vary, depending on the type of plant community preempted and the success of the reclamation plan. Postmining habitats within the 11,968-hectare (29,573-acre) permit area will consist of approximately 88 percent of managed and unmanaged forest (10,523 hectares; 26,023 acres), 10 percent of improved pasture seeded with species such as crimson clover (Trifolium incarnatum), ryegrass (Lolium perenne), bahiagrass, and/or common bermudagrass (1,192 hectares; 2,946 acres), 1.8 percent of wildlife habitat (214 hectares; 530 acres), and approximately 0.2 percent of developed water resources including permanent sedimentation ponds and livestock and wildlife watering ponds (30 hectares; 74 acres). Areas within the mined area that are restored to forest will be primarily commercial pine. Therefore, the postmining vegetational communities differ significantly from the premining vegetational communities, which are overwhelmingly dominated by native, natural forests and cutover/regeneration areas (Table 5-13, Section 5.5.1.1). Although pine plantations and improved pastures contain ecologically complex communities of soil micoorganisms and intricate chemical balances that influence productivity, these agricultural systems are relatively simple with regard to both floral and faunal diversity when compared with natural ecosystems such as forests or hydric habitats. Wildlife habitat areas, planted with blackberry (Rubus spp.), wax myrtle, flowering dogwood (Cornus florida), fringe tree (Chionanthus virginica) and other species, will be interspersed in reclaimed areas other than commercial forests specific to lease agreements, where possible. Wildlife habitat areas created around ponds and stream diversions will include water oak, Nuttall oak (Quercus nuttalli), Shumard red oak (Q. shumardii), and bald cypress.

In natural communities, species diversity is directly correlated with habitat variability. Variability of and discontinuity in topography and subsurface features are necessary to did not result in any observations of their preferred habitat (i.e., overmature open pine forest) and it is doubtful that any such areas exist on the site. A Biological Assessment of the entire mine area (32 years) was prepared by EPA to consider the effects of the proposed surface lignite mine on the Red-cockaded Woodpecker. As a result of this Assessment, EPA determined that there would be "no effect" on the Red-cockaded Woodpecker. This determination was provided to the FWS (Jackson, Mississippi). FWS concluded that the woodpecker would not be impacted by the proposed mining operation as currently planned since there appears to be no suitable habitat within the permit area. The FWS stated that Section 7 of the Endangered Species Act has been fulfilled but that further coordination should be initiated if modifications are made in the project, or if additional information concerning potential impacts to the woodpecker becomes available (see letter in Part II, Section B).

Habitat Qualitative Assessment. To provide a quality assessment of the basic terrestrial habitats on the Dolet Hills Lignite Mine Project area, the baseline data on breeding bird populations on the project site (EH&A, 1980c) were compared in detail to other similar data from the project region (Table 5-13A). Although a large variety of quality assessment techniques have been developed in recent years (Graber and Graber, 1976; Holling, 1978; FWS, 1978a, 1980a, 1980b; Sheffield, 1981), avian populations have received significant attention for their potential to serve as environmental quality indicators because of their ecological diversity and relative conspicuousness (Graber and Graber, 1976; Jarvinen and Vaisenen, 1979; Plunkett, 1979; FWS, 1979).

In summary, examination of quantitative bird census data on the major habitats of the project area suggests the following generalizations about habitat quality on the site: (1) Relatively mature upland forests of the project area contain typical wildlife assemblages of the region, comparable in density and diversity to other similar upland areas; (2) Over much of the project area where timber management practices have created young to medium-aged upland forests, wildlife assemblages are also very typical of second growth habitats in the region; (3) Within the realm of stand-ages present on the Dolet Hills project area, bird densities and diversities are typically low in clear-cuts and increase with stand age (Meyers and Johnson, 1978); (4) Bottomland hardwood forests, which typically have high bird densities and numbers of bird species, apparently show significantly reduced densities and diversities of breeding birds in the project area compared to other areas of bottomland hardwoods. Evidence in the form of depressed numbers of cavity-nesting birds suggests that recent timber management practices which

TABLE 5-13A

COMPARISON OF BREEDING BIRD POPULATIONS IN PROJECT REGION[a]

	Upland Forest		Clear-cut		Bottomland Forest	
	Region	Dolet Hills	Region	Dolet Hills	Region	Dolet Hills
Sample Size	11	1	16	1	7	1
Avg. Census Area (ha)	8.4 (6.3-12.1)[b]	15.0	14.0 (6.1-20.2)	25.0	11.8 (6.5-25.0)	11.3
Avg. No. of Species	15 (9-21)	18	13 (4-21)	21	23 (16-29)	15
Avg. Density[c]	864 (320-1,268)	797	676 (316-930)	648	2,064 (1,374-3,080)	939
Avg. Diversity[d]	2.95 (1.80-4.24)	3.48	2.69 (0.81-3.96)	3.89	4.91 (4.10-5.81)	2.97

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a. Breeding bird censuses in project region were taken from American Birds, Vols 29-37 (1974-1983), and Dickson and Segelquist (1979). Data for the Dolet Hills Project area are from EH&A (1980c).

b. Ranges of values are shown in parentheses.

c. All densities have been converted to birds per square kilometer for comparability.

d. Whittaker's diversity, d = s/log A, where s = no. of species and A = census area in square meters.

reduce the amount of standing dead timber may be one of the prominent factors limiting the avian populations. Based on the methodology used in the qualitative assessment (see Appendix D of this SFEIS), the limited availability of data, and realization that the quality of the habitats in the permit area varies within community types, the following assessments have been made of habitats to be affected by the proposed project:

1. Upland forest quality is fair to good.
2. Clearcut forest quality is fair to good.
3. Bottomland hardwood forest quality is fair at best.

5.5.2.2 Effects of No Action

The no action alternative would eliminate the adverse impacts of construction and operation related to the proposed project.

In the absence of the proposed Dolet Hills Lignite Mine Project, the future of the area would probably remain largely in its present state with lumbering of marketable timber being the predominant activity affecting wildlife. As individual land ownership changes and lands are passed along to new owners, land use practices on those and other lands may or may not change but it is unlikely that any given factor will create a drastic broad scale change in the entire permit area within a short time period.

5.5.2.3 Construction Impacts

The primary direct adverse impact of construction activities related to the proposed lignite mine on wildlife will be the result of the previously discussed vegetation clearing (Section 5.4.3) and associated habitat disturbances. Clearing activities in the ancillary area will result in the direct destruction of some forms of wildlife that are not mobile enough to avoid construction operations. These include species of small amphibians, reptiles, mammals, and some age classes of birds (e.g., nestlings and fledglings). Larger, more mobile species of wildlife may avoid the initial clearing activity and in-migrate into adjacent habitats. However, each species of animal is dependent on available resources such as food, shelter, water, territory, and nesting sites from its habitat, and any given area of habitat will have a certain amount of these resources (Dempster, 1975). The carrying capacity of a habitat for a species is determined by the availability of these resources and, in particular, the availability of critical limiting resources. Unless data

5.5.2.4 Operation Impacts

Clearing of the mining blocks will occur throughout the 32-year life of the mine and will take place a few hundred feet in simultaneous advance of the operating draglines. Thus, even though the mining blocks encompass 6,259 hectares (15,466 acres), the actual area in which clearing is ongoing will be much smaller. The adverse impacts to wildlife during clearing will be of the same nature as those discussed in the previous section on construction. However, the magnitude of both direct and indirect adverse impacts resulting from clearing during the operational phase of the mine will be much greater due to the larger area to be affected. Habitats which will be cleared include 4977.9 hectares (12,300.1 acres) of upland forest, 317.0 hectares (783.3 acres) of bottomland forest, 13.6 hectares (33.6 acres) of aquatic and wetland habitats, and 950.6 hectares (2349.0 acres) of grassland habitats. Wetlands delineated by the USCE (102.3 hectares; 253 acres) will not be directly impacted; however, there may be indirect adverse impacts to these and adjacent wetlands as a result of dewatering and ancillary activities. Wildlife species that will be adversely affected by this clearing include those species previously discussed in Section 5.5.2.1 as being typical of those habitats. The habitat quality assessment indicates that upland forested and second-growth habitats to be adversely affected are typical of such habitats in the project region and are considered fair to good habitats. The bottomland hardwood community to be adversely affected in the Dolet Hills Mine area presently appears to have diminished wildlife assemblages, and is judged to be fair quality habitat at best. This is indicated by bird population studies and may be the result of timber management practices (see Appendix D of this SFEIS).

The type of wildlife species which will inhabit the mined area and the structure, diversity and dynamics of the wildlife communities will depend to a major extent on the practical application of the reclamation plan (including fish and wildlife measures) and on postmining land use. Based on the reclamation plans, the postmining fauna of the mined area will greatly differ in species composition and community structure from the existing wildlife communities. Numerous studies have documented similar adverse impacts on strip mined areas (e.g., Cantle, 1978; Brewer, 1958; Karr, 1969; Allaise, 1979; Wray et al., 1982).

Electrocution of raptors appears to be a greater problem in the Western States (Miller et al., 1975) and where natural perches are not available. The exact voltage requirements for the mining operations have not been finally established. It is anticipated that a et al. (1980), Dickson (1978), and Meyers and Johnson (1978) support this opinion. In the case of strip-mining, the differences between the reclaimed forest and "natural" forest will be even greater due to the removal of seeds and roots which increase the diversity of plants in early and late seral stages.

The areal extent and location of area available for restoration to wildlife habitat is severely restricted by landowner preference for postmining land uses conducive to forestry/agricultural production. According to current lease agreements, 50 percent of leased lands will be planted in pine only, 13 percent will be planted in pasture only, and 37 percent will be planted in grass or pine seedlings only.

Fish and wildlife habitat (specifically designated) and developed water resources are to represent 1.8 percent and 0.2 percent, respectively, of the postmining land use in the permit area. These areas offer the greatest opportunity for providing habitat for many species which would not otherwise occur in the permit area. Fee land that is owned exclusively by SWEPCO/CLECO without obligation totals approximately 203 hectares (500 acres). This land is distributed in nine 4.0-32.4 hectare (10-80 acre) tracts in the eastern and western portions of the area to be mined, and will be reclaimed primarily to wildlife habitat. These areas will be planted with tree and shrub species that are preferred for wildlife food and cover (see Section 4.4.5.2). Fish and wildlife areas will also be established where appropriate along fence rows, pipeline corridors, transmission line corridors, roads, or other suitable areas. In addition, fish and wildlife habitat (riparian habitat) is to be established around postmining ponds and adjacent to diverted streams. Most diverted streams will be replaced in more or less a straight channel; however, some channel meanders and intermittent pool and riffle areas will be constructed. Ponds will be constructed with shallow littoral zones and with maximum shoreline to benefit various wildlife species.

In conclusion, the extent of adverse impacts on wildlife depends on the effectiveness of the planned and implemented reclamation efforts; however, it appears that certain habitats such as mature pine-beech forest, the limited swamps, and most of the bottomland hardwoods will not be replaced. Overall diversity throughout the mined areas will be reduced. The structure and species composition of wildlife communities in the affected areas will be greatly changed resulting in a major adverse long-term impact on the wildlife resources of the area. The regional effects of this adverse impact are discussed in Section 5.9.

Other Important Species. Although no single species could be considered critical to the well-being of the recreationally or commercially valuable species discussed above, forage fish, as a group, are extremely important as food items for the larger predatory game fish. Based on survey results, the most important forage species on-site appear to be minnows, shad, and mosquitofish. Smaller species (most sunfish) feed largely on aquatic invertebrates.

5.5.3.2 Effects of No Action

Under the no action alternative, adverse impacts of construction and operation of the Dolet Hills Lignite Mine Project would not occur.

The future without the project is that the currently dominant land uses, silviculture, and oil and gas production are expected to continue. Therefore, the present level and nature of impacts to the aquatic environments of the project area can be expected to continue.

5.5.3.3 Construction Impacts

Site preparation and construction activities include clearing of vegetation, construction of access and haul roads, and erection of administrative, maintenance and service buildings. Some of these activities (e.g., vegetation clearing, road construction), and others which may be classified as construction such as diversions and sedimentation ponds, will continue throughout the life of the project as mining progresses. Therefore, it should be recognized that the construction impacts, like the operation impacts, will not affect the entire project area simultaneously.

The activities listed above can be expected to impact the streams of the project site through: 1) destruction of existing stream channels (e.g., channel realignments); 2) increases in suspended solids loading; 3) changes in nutrient inputs; 4) reduction in the shade and organic material provided by riparian vegetation; and 5) alteration of the flow regime. Outside the permit boundaries, only 2), 3), and 5), above, could be expected to produce impacts on the downstream segments of these water courses.

Increases in suspended solids can be expected in the runoff from areas in which vegetation clearing, road building, or other construction activities take place. As the mining plan calls for the construction of 116 sedimentation ponds over the life of the project, impacts et al., 1978), and the second was the Dolet Hills Lignite Prospect Survey (Heartfield, Price and Greene, Inc., 1980).

A total of 58 cultural resources sites within the mine permit boundaries were recorded during these surveys. These included 13 archaeological sites, 10 standing structures, 27 possible archaeological sites, 7 isolated occurrences, and 2 historic cemeteries. The Mansfield Battle Park (16DS187), located west of the permit area, is currently listed on the National Register of Historic Places (NRHP).

No known cultural resources sites within the surveyed portion of the permit area are listed on the NRHP. One historic standing structure (16DS153) was considered eligible for nomination to the NRHP by Heartfield, Price, and Greene (1980) and was recommended for further work. This standing structure has been approved by the State Review Committee, and its nomination to the NRHP is presently pending in Washington, D.C. Four additional historic standing structures (16DS144, 16DS145, 16DS162, and 16DS164) are recommended for further evaluation to determine their potential for nomination to the NRHP (Heartfield, Price, and Greene, 1980).

Site 16DS153 is composed of a large pre-Civil War modified dogtrot residence, a wood and sheet metal storage shed and a wooden pumphouse. The main house has been reported to have been used as a temporary hospital during the Battle of Mansfield or Sabine Crossroads. The construction date, its excellent condition, and the fact that the structure was used during the Civil War, makes it eligible for nomination to the NRHP.

Site 16DS144 is a late 19th or early 20th century farm complex consisting of a 1½-story bungalow style house, a multi-crib barn, and a wooden pumphouse. The property is in excellent condition and represents a vanishing folk-type house.

Site 16DS145 is an early farm complex composed of a main residence, a garage, two single-crib barns, chicken sheds, a single-crib house, and a double-crib barn.

Site 16DS162 is a modern dairy complex consisting of a main residence and several out buildings. The main residence appears to be a modified L-shaped dogtrot house, 1½ stories tall with a double gable roof. The date of construction of the house and related outbuildings is within the 1930's.

Site 16DS164 is an early 20th century farm complex containing a house, a barn, and three wood and sheet metal sheds. The main house was built in 1913 and is in good condition.

5.6.4 Effects of No Action

The no action alternative would eliminate the potential adverse impacts of construction and operation related to the proposed Dolet Hills Lignite Mine Project.

If the proposed mine is not constructed, the future environmental conditions within the permit area would remain approximately as they presently exist, with the exception of deterioration due to natural weathering and possible vandalism of cultural resources sites. Existing cultural resources sites would not be impacted by the project, and there would be no need for determinations of NRHP eligibility or any further work. The future without the project would result in elimination of EPA's review of cultural resources which may exist within the project boundaries. Knowledge gained through mitigation of these sites as part of EPA's NPDES permit condition to comply with section 106 would be lost.

5.6.5 Construction Impacts

Surveys conducted on 18 percent of the proposed permit site have identified 58 cultural resources sites. One potential NRHP (16DS145) is within the ancillary activities area. Construction of the main office, field offices, erection pads, haul roads, conveyor system, etc. will not affect this site, but a potential exists for indirect impacts (e.g., increased exposure to human contact). Surveys of the remaining 82 percent of the permit area could reveal the location of additional cultural resources sites within the impact area that may be eligible for nomination to the NRHP.

A Proposal for Agreement was signed by EPA and the Louisiana State Historical Preservation Officer (SHPO), and forwarded to the Advisory Council on Historic Preservation. This Proposal is to become the Memorandum of Agreement (MOA) when ratified by the Council (see Appendix B of the SFEIS). Compliance with the MOA as a condition of the NPDES permit will satisfy the requirements of Section 106 of the National Historic Preservation Act (NHPA). The intent of this MOA is to avoid or minimize construction-related adverse impacts on cultural resources. Prior to construction activities, potential project-related adverse effects on significant cultural resources

5.6.6 Operations Impacts

Mine site operations will impact four cultural resources sites that have been recommended for further work. The first is site 16DS153. The nomination of this site to the NRHP is presently pending in Washington, D.C. According to the mining schedule, this site will be impacted in the year 2007. The second site, 16DS144, is recommended for further testing to determine its possible nomination to the NRHP. The site is a late 19th or early 20th century farm complex in excellent condition that may contain a vanishing folk-type house. The site will be impacted in the year 2005. The third site, 16DS162, consists of an early 20th century L-shaped dogtrot house with several outbuildings. This site will be impacted in the year 1994. The third and final site, 16DS164, is recommmended for further testing to determine its nomination potential to the NRHP. This site is an early 20th century farm complex that may be architecturally significant, and it will be impacted in 1998.

Mining operations are scheduled to be performed near Mansfield Battle Park around the year 2003. Mining will not be initiated within 91 meters (300 feet) of the park in compliance with LSMR 161.11(f). Cultural resources that may be associated with the battle area around the park and that may be affected by mining operations are addressed by the MOA.

The probability exists that additional cultural resources sites eligible for inclusion on the NRHP may be located on the remaining unsurveyed portion of the proposed permit area. Impacts on sites recommended for further testing will be coordinated through the Louisiana SHPO, as specified by the MOA.

5.6.7 Combined Impacts of Power Plant and Mine

Cultural resources sites encountered during field surveys of the proposed mine/power plant project are given in detail in Section 5.6.3 of this document and Section 4.6 of the Draft EIS for the Dolet Hills Power Plant Project (EPA, 1981). They are summarized as follows: 1) Power plant project - No cultural resources sites on or eligible for nomination to the NRHP were found within the proposed area of the power plant facilities during a 100-percent survey. A railroad right-of-way was surveyed prior to construction clearing activities in accordance with an MOA between the EPA, the Louisiana SHPO, and the

Advisory Council on Historic Preservation. No significant cultural resource sites were encountered (EH&A, 1982b). During construction clearing activities Site 16DS212 was discovered. The site contained both early Caddo and Historic Caddo components. A testing program was conducted followed by mitigation of the site. These investigations were coordinated with the Louisiana SHPO. Both draft and final reports containing results of these investigations have been submitted to the Louisiana SHPO for review; 2) Mine site - Four cultural resources sites within the 18 percent portion of the mine area already surveyed have been recommended for further work. One additional site occurs within the ancillary activity area.

5.7 SOCIOECONOMICS

5.7.1 Existing Environment

The existing socioeconomic conditions in the four-parish area (De Soto, Sabine, Red River and Natchitoches), as presented in the Dolet Hills Power Plant Draft EIS (EPA, 1981), have remained relatively unchanged up to now. The following sections, therefore, present summaries of that document or new information that has become available since the publication of the 1981 EIS. More detailed information and methodologies may be found in EH&A, 1981c.

5.7.1.1 Economic Profile

Manufacturing, trades, and services continue to be the leading economic sectors in the area with regard to employment and income. Local unemployment rates have risen nearly two percentage points since 1980. Reported 1981 unemployment rates ranged from 7.7 percent in De Soto Parish to 10.6 percent in Sabine Parish, compared to 8.4 percent for the State (Robinson, 1982).

Personal income increased at a slight-to-moderate rate in most sectors since 1980. Manufacturing, which increased most notably in Natchitoches Parish, is the leading income producer in all four project-area parishes. In addition, per capita income in the area improved slightly, reaching 74 percent of the State average. Natchitoches Parish reported the largest per capita income increase (U.S. Department of Commerce, Bureau of Economic Analysis, 1981).

5.7.1.6 Transportation Facilities

The major highways serving the immediate project site area are U.S. 84, U.S. 171 and State Highway (LA) 1. U.S. 84 travels in an east-west direction, connecting Mansfield to Coushatta, while U.S. 171 and LA 1 travel in a north-south direction, connecting Shreveport to the project area. Average daily traffic (ADT) along U.S. 84 near the project site entrance increased 62.5 percent between 1980 and 1981, from 1,140 to 1,853 vehicles per day. Reported ADT levels in 1981 range between 4,357 and 4,880 vehicles along LA 1 and between 3,300 and 6,881 vehicles along U.S. 171 (Louisiana Department of Transportation and Development, 1981).

Transportation operations along these major thoroughfares in the project area are becoming strained by increasing transportation demands. Reconstruction of U.S. 84 has begun near the proposed project site entrance. In addition, plans have been formulated to construct Interstate (I) 49, a north-south four-lane expressway connecting I-10 (Lafayette) with I-20 (Shreveport). Construction on the section traversing De Soto Parish will occur sometime between 1984 and 1986.

5.7.1.7 Recreation Facilities and Aesthetics

The majority of the recreation sites in the project area vicinity are local and parish-supported parks. However, Mansfield Battle State Park, the Sabine State Wildlife Management Area, and portions of the Kisachie National Forest are located in the four-parish project area. According to planning standards used by the Coordinating and Development Corporation, the project area is in serious need of more basketball courts, playgrounds and playfields (CDC, 1981).

5.7.2 No Action Alternative

The no action alternative would eliminate the beneficial and adverse impacts of construction and operations of the proposed lignite project. If the proposed mining project is not undertaken, the projected adverse impacts to area communities associated with in-migrating population (i.e., housing, transportation, services) would not occur, and the project benefits, in the form of jobs, income, and local tax revenues, would be lost.

Because there are several other lignite or other industrial projects proposed or now underway in the area, it is unlikely that the future without the Dolet Lignite Mine Project would substantially alter future community conditions or area development patterns.

5.7.3 Construction Impacts of the Proposed Project

5.7.3.1 Economic Impacts

Direct Employment. Major construction of the proposed Dolet Hills Lignite Mine Project is scheduled to begin in the third quarter of 1983 with 45 workers, increasing to a peak of 112 workers in the first half of 1984 and constitutes a direct short-term beneficial impact. Construction employment will begin to decline thereafter and will cease by the beginning of 1987. See Table 5-14 for a detailed schedule of construction employment.

Due to the shortage of skilled construction workers and the competing labor demands of several other major construction projects in the project area, it is estimated that only about 22 of the peak 112 construction workers will be hired from the local labor force. Approximately 45 of the remaining 90 workers will in-migrate into the area, and an equal number will commute from outside the area. Most of the commuting workers will come from Shreveport, which is about 45 minutes away by car and offers adequate housing, services, and amenities.

The number of construction workers who in-migrate is difficult to predict precisely because of the variable construction schedules of the other major construction projects in the area. It is therefore possible that the extent of in-migration for the proposed project may be somewhat mitigated by the release of construction workers from another project. (For further information on this point, see "Cumulative Effects," Section 5.9.)

Indirect Employment. Indirect, or secondary, employment is a beneficial impact created as a result of increased service demand and income associated with contruction employees. The total potential of a basic construction work force to support secondary employment within the local project area is diminished by the tendency of workers, including those who reside locally, to spend a significant portion of their income outside the project area. Based on observations of similar energy projects, it is estimated that each locally residing construction worker will support the employment of 0.8 secondary workers. As shown in Table 5-14, at peak construction the 67 locally residing workers

Three major electric power transmission lines, one 34.5 kV and two 138 kV, traverse the area. These lines are operated by CLECO. Also, two rural water distribution systems operate within the area, the East De Soto Water System along State Highway 522 in the northwest portion of the project site and the Wallace-Rambin Water System near State Highway 346 in the southeast portion of the site.

5.8.2 Impacts of No Action Alternative

The no action alternative would eliminate the adverse impact of construction and operation related to the Dolet Hills Lignite Mine Project.

Future land-use trends in the permit area are expected to follow a similar pattern to those now occurring should the project not be constructed. Industrial growth (i.e., manufacturing, other energy-related developments) will likely increase the conversion and loss of agricultural land including undeveloped forestland and pastureland. Increased industrial development will further contribute to greater urbanization as population in-migration becomes evident. Future secondary impacts as a result of the project not being constructed will also result in increased urbanization.

5.8.3 Impacts of Construction

The Dolet Hills Lignite Mine Project will convert approximately 253 hectares (625 acres) of primarily developed and undeveloped forestland to industrial use, an adverse impact for life of the project, after which ancillary facilities will be dismantled and the area will be reclaimed according to landowner preference. Project construction activities which could affect land uses include relocation of pipelines, roads, streams, and transmission lines; and construction of haul roads, conveyor system and ancillary facilities. Lignite will be recovered from the mostly forested mining blocks incremently over the life of the mine and mined areas will be reclaimed immediately after backfilling is completed. Thus, individual mining blocks are considered to be adversely impacted by this short-term industrial use.

The proposed haul roads and conveyor system will disturb an estimated 70.8 hectares (175 acres), and 65.6 hectares (162 acres), respectively, of largely undeveloped forestland. Major ancillary facilities include the main office block and field workshops and encompass a total of 72.8 hectares (180 acres), 11 percent of which is pastureland and the remaining

Acreages of SCS prime farmland which exist within the boundaries of the proposed project and other proposed surface lignite mines/associated facilities in the region are presented in Table 5-26. A total of 18,602 hectares (46,506 acres) of SCS-designated prime farmland would potentially be adversely affected by the proposed projects. This constitutes approximately three percent of the total prime farmland in the region of the Dolet Hills Lignite Mine Project.

5.9.2 Ground Water

Within 96.5 kilometers (60 miles) of the proposed Dolet Hills Lignite Mine Project, there are at least five proposed or currently active surface mining operations of the same class size. At each mine, significant thicknesses of Wilcox Group sediments will be disturbed for lignite extraction over an approximate 30-year period.

In general terms, the ground-water systems at each of these projects are very similar, as they are all subject to similar structural and stratigraphic controls. The ground-water impacts associated with each operation are anticipated to be about the same as those described for the Dolet Hills Mine; extending a distance of not more than .8 kilometers (.5 mile) from a project's boundaries. From a hydrologic standpoint, the distance between the project locations indicates that the impacts for one project are distinct and separate from those of another.

Should the potential exist for the radius of influence of two or more mines to overlap, one possible outcome would be that ground-water drawdowns in the overlap area would be greater than one would expect from a single project separately; therefore, a cumulation of impacts to ground water would result. It could also be possible, however, that dewatering or depressuring requirements for the mines could be achieved with smaller scale dewatering systems than currently envisioned.

A possible exception to the general conditions occurs in the case of the proposed Dolet Hills Lignite Mine and the permitted Oxbow Mine. The Oxbow Mine is located in the topographically flat, Red River alluvial valley, approximately 4 kilometers (2.5 miles) east of the Dolet Hills Project's eastern boundary. At the Oxbow Mine, lignite will be mined from Wilcox Group formations that underlie an average 15.2 to 27.4 meters thickness (50 to 90 foot) of saturated, relatively permeable, alluvial deposits. Dewatering of the alluvial deposits will be conducted within a system of vertical, slurry cutoff walls that alluvial deposits will be conducted within a system of vertical, slurry cutoff walls that extend from ground surface to the base of the alluvium. Because highly permeable alluvial material will be dewatered at Oxbow, the radius of influence associated with this material is greater than that of the low permeability Wilcox sediments. Mathematically, the radius of influence from dewatering such material could overlap at a 4 km (2.5 mi) distance; however, the alluvial material at Oxbow does not extend into, and will not be mined at Dolet Hills. In addition, the water-bearing formations of the underlying Wilcox formation will be depressurized to prevent water-inflow and pit-stability problems.

Dewatering and depressurization at the Dolet Hills Project is planned to be a far less extensive undertaking. The depths of mining involved are generally less and hydrostatic pressures encountered during mining should be notably less than those encountered at the Oxbow Mine. There exists, therefore, little likelihood that accumulations of ground water impacts between these two mines will occur.

5.9.3 Surface Water

5.9.3.1 Hydrologic Conditions

Cumulative impacts of multiple projects on the hydrologic characteristics of an area (i.e., streamflow conditions, water availability) are possible whenever watersheds or streams common to two or more projects are affected. In such instances, any cumulative impacts are largely dependent upon the proximity of the projects within a watershed, the characteristics of the commonly-affected stream(s) (e.g., drainage area, magnitude of flows, etc.), and the separate impacts of the individual projects on hydrologic conditions.

In the case of the proposed Dolet Hills Lignite Mine and Power Plant Projects and other known projects in the area, major instances of cumulative surface water impacts are not anticipated. As noted previously, the proposed project's mining operations will occur within portions of both the Red and Sabine river basins, and effects on streamflow characteristics (runoff peaks and volumes, low flow characteristics, etc.) will be distributed among a number of streams in both basins. Other existing or announced mine and/or power plant projects in the area, including Martin Lake, South Hallsville/Pirkey, and Castor Bayou in the Sabine River Basin, and Oxbow, Chicot and Big Cajun #3 and #4 in the Red River Basin, can be expected to have similar effects on streamflow characteristics within their immediate areas. However, as such effects are very localized

TABLE 5-26

PRIME FARMLAND IMPACTED BY PRESENT OR PLANNED SURFACE LIGNITE MINES/ASSOCIATED FACILITIES IN THE VICINITY OF THE DOLET HILLS LIGNITE MINE PROJECT

Project[a]	Parish/County	SCS Prime Farmland (acres)[b]	LOCSMD/RRC Historical Use Prime Farmland (acres)
Dolet Hills Mine/Power Plant	DeSoto	7,444	227
Castor Bayou Mine	DeSoto	6,376	46
Oxbow Mine/Power Plant	DeSoto Natchitoches Red River	17,005	NA[c]
Martin Lake Mine D	Rusk	9,367	NA
South Hallsville Mine/ Power Plant	Harrison	6,314	0

[a] Chicot Mine/Big Cajun #4 Power Plant is planned for Red River and Bienville parishes but no public information is available.

[b] For conversion to metric, see Conversion Table.

[c] NA = not available.

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PART IV

PREFERRED ALTERNATIVES

PART IV PREFERRED ALTERNATIVES

DHMV's preferred alternative is to construct and operate the lignite mine as proposed and evaluated in the SDEIS and SFEIS. EPA's preferred alternative is to issue the NPDES permit to DHMV as drafted and included in Appendix A of the SFEIS. This EPA permit is conditioned to satisfy the requirements of Section 106 to protect cultural resources.

On or about the same day that this SFEIS is made available for review, EPA will give Public Notice of its draft NPDES permit for the Dolet Hills Lignite Mine. Therefore, both EPA's SFEIS and draft permit issuance will be subject to public review for about the same 30-day period. Specific comments on the NPDES permit must be addressed to:

Mr. Mark Satterwhite (6W-PS)
U.S. EPA, Region 6
1201 Elm Street
Dallas, TX 75270

If no substantial comments are received, the NPDES permit will become effective 30 days from the date of the Public Notice provided for the permit. Any person may request an Evidentiary Hearing on this final permit decision. However, the request must also be submitted within 30 days from the date of the Public Notice for the permit. This request should be in accordance with the requirements of 40 CFR 124.74 (Federal Register Vol. 45, No. 98, Monday, May 19, 1980).

After the 30-day review of the SFEIS and completion of the NPDES permit issuance process, a Record of Decision will be prepared which will document the end of the environmental review and EPA's action on the NPDES permit. This Record of Decision will be distributed to those who make substantive comments on the SFEIS and to those who request a copy.

APPENDIX A

Draft NPDES Permit for the Dolet Hills Surface Lignite Mine

Permit No. LA0064076
Application No. LA0064076

Draft

Draft

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Dolet Hills Mining Venture
South Park Office Plaza, Suite 209/210
9029 Mansfield Road
Shreveport, Louisiana 71118

is authorized to discharge from a facility located Dolet Hills Lignite Project near Mansfield, De Soto Parish, Louisiana

to receiving waters various tributaries to the Sabine River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Signed this day of

Draft

Myron O. Knudson

Myron O. Knudson, P.E.
Director, Water Management Division (6W)

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Outfall 001, sedimentation pond discharge ***

During the period beginning the effective date and lasting through the expiration of this permit

the permittee is authorized to discharge from Outfall(s) serial number(s) 001, sedimentation pond discharge ***.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	kg/day(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow-m^3/Day(MGD)	N/A	N/A	*	*
Total Suspended Solids	N/A	N/A	35.0 mg/l	70.0 mg/l
Total Iron	N/A	N/A	3.0 mg/l	6.0 mg/l
Total Manganese	N/A	N/A	2.0 mg/l	4.0 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow-m^3/Day(MGD)	1/day**	Estimate****
Total Suspended Solids	1/day**	Grab
Total Iron	1/day**	Grab
Total Manganese	1/day**	Grab

* Report
** During periods of discharge
*** See Part III, Paragraph G.
**** See Part III, Paragraph B.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/day** by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the flow measuring device at the discharge from the sedimentation pond.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Outfall SIJ and SIV, treated sanitary sewage discharge to sedimentation ponds OIJ and OIV, respectively

During the period beginning the effective date and lasting through the expiration of this permit

the permittee is authorized to discharge from Outfall(s) serial number(s) SIJ and SIV, treated sanitary sewage discharge to sedimentation ponds OIJ and OIV, respectively .

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	kg/day(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow-m^3/Day(MGD)	N/A	N/A	*	*
Total Suspended Solids	N/A	N/A	30 mg/l	45 mg/l
Biochemical Oxygen Demand (5-day)	N/A	N/A	30 mg/l	45 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow-m^3/Day(MGD)	Daily	Estimate
Total Suspended Solids	1/week	Grab
Biochemical Oxygen Demand (5-day)	1/week	Grab

* Report
** Delete

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Prior to discharge to the sedimentation pond.

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

NONE

PART II
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. Penalties for Violations of Permit Conditions

The Clean Water Act provides that any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

5. Toxic Pollutants

Notwithstanding paragraph A-4, above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the permittee so notified.

The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" Section B, Paragraph B-3 and "Upsets" Section B, Paragraph B-4, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c and d of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section D, Paragraph D-6 (24-hour notice).

d. Prohibition of bypass.

(1) Bypass is prohibited and the Director may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under paragraph c of this section.

(2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph d(1) of this section.

4. Upset Conditions

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph c of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in Section D, Paragraph D-6.

(4) The permittee complied with any remedial measures required under Section A, Paragraph A-3.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration and operation of acceptable flow measurement devices can be obtained from the following references:

a. "A Guide to Methods and Standards for the Measurement of Water Flow", U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U. S. Government Printing Office, Washington, D. C. 20402. Order by SD catalog No. C13.10:421).

b. "Water Measurement Manual", U. S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U. S. Government Printing Office, Washington, D. C. 20402. Order by Catalog No. I27.19/2:W29/2, Stock No. S/N 24003-0027).

c. "Flow Measurement in Open Channels and Closed Conduits, U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS), Springfield, VA 22151. Order by NTIS No. PB-273 535/5ST).

d. "NPDES Compliance Sampling Manual", U. S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-51, 1977, 140 pp. (Available from the General Services Administration [8FFS], Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225).

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

5. Reporting of Monitoring Results

Monitoring results must be reported on a Discharge Monitoring Report (DMR) form (EPA No. 3320-1). Monitoring results obtained during the previous 3 months shall be summarized for each month and reported on a DMR form postmarked no later than the 28th day of the month following the completed reporting period. The first report is due ________________. Duplicate copies of DMR's signed and certified as required by Section D, Paragraph D-11, and all other reports required by Section D, Reporting Requirements, shall be submitted to the Regional Administrator and the State at the following addresses:

Myron O. Knudson, P.E., Director
Water Management Division (6W)
U.S. Environmental Protection Agency
Region VI
First International Building
1201 Elm Street
Dallas, Texas 75270

J. Dale Givens, Administrator
Water Pollution Control Division
Office of Environmental Affairs
Louisiana Dept. of Natural Resources
P.O. Box 44066
Baton Rouge, Louisiana 70804

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless other wise specified by the Director in the permit.

8. Retention of Records

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Record Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Transfers

This permit is nontransferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

4. Monitoring Reports

Monitoring results shall be reported at the intervals and in the form specified in Section C, Paragraph C-5 (Monitoring).

5. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

6. Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

The following shall be included as information which must be reported within 24 hours:

a. Any unanticipated bypass which exceeds any effluent limitation in the permit.

b. Any upset which exceeds any effluent limitation in the permit.

c. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in Part III of the permit to be reported within 24 hours.

7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Section D, Paragraphs D-1, D-4, D-5, and D-6 at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D-6.

8. Changes in Discharges of Toxic Substances

The permittee shall notify the Director as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the "notification levels" described in 40 CFR 122.61.

b. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

9. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

10. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

11. Signatory Requirements

All applications, reports or information submitted to the Director shall be signed and certified.

a. All permit applications shall be signed as follows:

   (1) For a corporation: by a principal executive officer of at least the level of vice-president;

   (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

   (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   (1) The authorization is made in writing by a person described above.

   (2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

   (3) Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

12. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

13. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

PART III
OTHER CONDITIONS

A. The "daily average" concentration means the arithmetic average (weighted by flow value) of all the daily determinations of concentration made during a calendar month. Daily determinations of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during that calendar day.

The "daily maximum" concentration means the daily determination of concentration for any calendar day.

B. Methods of flow estimating shall be by the "California Pipe Method" as described in section 7.4.2.2. of the Handbook for Monitoring Industrial Wastewater, August 1973, U.S. Environmental Protection Agency, Technology Transfer.

C. Effluent Limitations for Precipitation events

(a) Any discharge or increase in the volume of a discharge caused by precipitation less than or equal to the 10-year, 24-hour precipitation event (or series of storms or snowmelt of equivalent volume) may comply with the following limitations instead of the otherwise applicable limitations:

Effluent Limitations During Precipitation

Pollutant or Pollutant Property	Maximum for any one day	Average of daily values for thirty consecutive days
Settleable Solids	0.5 ml/1	N/A
pH	Within the range of 6.0 to 9.0 at all times	

(b) Any discharge or increase in volume of a discharge caused by precipitation greater than the 10-year, 24-hour event (or series of storms or snowmelt of equivalent volume) may comply with the following limitations instead of the otherwise applicable limitations:

Effluent limitations During Precipitation

Pollutant or Pollutant Property	Maximum for any one day	Average of daily values for thirty consecutive days
pH	Within the range of 6.0 to 9.0 at all times	

(c) The operator shall have the burden of proof that the discharge or increase in discharge was caused by the applicable precipitation event described in subsections (a) and (b).

D. 10-year 24-hour Precipitation Event

The term "10-year, 24-hour precipitation event" means the maximum 24-hour precipitation event with a probable recurrence interval of once in ten years as defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, or equivalent regional or rainfall probability information developed therefrom.

E. Effluent Limitations for Reclamation Areas

The following standards apply to discharges from reclamation areas until SMCRA bond release

Effluent Limitations

Pollutant or Pollutant Property	Maximum for any one day	Average of daily values for thirty consecutive days
Settleable Solids	0.5 ml/l	N/A
pH	Within the range 6.0 to 9.0 at all times	

F. Determination of Settleable Solids

The following procedure shall be used to determine settleable solids:

Fill an Imhoff cone to the one-liter mark with a thoroughly mixed sample. Allow to settle undisturbed for 45 minutes. Gently stir along the inside surface of the cone with a stirring rod. Allow to settle undisturbed for 15 minutes longer. Record the volume of settled material in the cone as milliliters per liter. Where a separation of settleable and floating materials occurs, do not include the floating material in the reading.

The method detection limit for measuring settleable solids shall be 0.4 ml/l.

G. Initial Discharge Location

Discharge Serial No.	Latitude	Longitude	Receiving Stream
01A	31° 58' 24"	93° 28' 46"	West Branch Dolet Bayou
01B	31° 58' 21"	93° 28' 32"	West Branch Dolet Bayou
01C	31° 58' 12"	93° 28' 12"	West Branch Dolet Bayou
01D	31° 57' 45"	93° 27' 42"	West Branch Dolet Bayou
01E	31° 57' 38"	93° 27' 36"	West Branch Dolet Bayou
01F	31° 57' 28"	93° 29' 35"	Blanchard Bayou
01G	31° 57' 32"	93° 29' 32"	Blanchard Bayou
01H	31° 57' 34"	93° 29' 25"	Blanchard Bayou
01I	31° 57' 26"	93° 29' 05"	Blanchard Bayou
01J	31° 57' 22"	93° 28' 14"	Dead Negro Bayou
01K	31° 57' 13"	93° 28' 23"	Dead Negro Bayou
01L	31° 56' 35"	93° 29' 56"	Louies Bayou
01M	31° 56' 48"	93° 29' 46"	Louies Bayou
01N	31° 56' 54"	93° 29' 31"	Louies Bayou
01O	31° 57' 00"	93° 29' 33"	Louies Bayou
01P	31° 56' 59"	93° 29' 16"	Louies Bayou
01Q	31° 56' 57"	93° 28' 47"	Louies Bayou
01R	31° 57' 11"	93° 28' 45"	Louies Bayou
01S	31° 57' 11"	93° 28' 00"	Louies Bayou
01T	31° 57' 06"	93° 27' 51"	Louies Bayou
01U	31° 56' 49"	93° 27' 27"	Prairie Bayou
01V	32° 02' 32"	93° 37' 52"	Five Mile Bayou
01W	32° 02' 20"	93° 37' 59"	Five Mile Bayou

H. Locations may be revised by the permittee if it becomes necessary to eliminate or establish new holding ponds. For any revision the permittee shall submit appropriate maps redesignating the holding pond location.

The permittee shall notify EPA and LDNR as each new holding pond (discharge point) is developed and also when each discharge point is discontinued.

Any revised pond or outfall location should be consistent with and fall within the mining area boundary as defined in the applicant's State Mining Plan.

Any revised pond or outfall location shall be limited to discharging to the same receiving body of water.

I. The Memorandum of Agreement executed by EPA, the Advisory Council on Historic Preservation and the Louisiana State Historic Preservation Officer for the coal mining operation which is the subject of this permit is hereby incorporated by reference and expressly made a part of this permit. The permittee shall comply with the stipulations of such Memorandum of Agreement.

APPENDIX B

Memorandum of Agreement (MOA)

**Advisory
Council On
Historic
Preservation**

1522 K Street, NW
Washington, DC 20005

580

6ESV
cc: 6ORC (5th
6A (5th
6DG (5th)

RECEIVED
MAY 31 1983
6 ES

MAY 23 1983

Mr. Dick Whittington
Regional Administrator
Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, TX 75270

Dear Mr. Whittington:

The enclosed Memorandum of Agreement has been ratified by the Chairman of the Council. This document constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act and the Council's regulations. A copy of the ratified Agreement has also been sent to the Louisiana State Historic Preservation Officer.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,

Thomas F. King
Director, Office of Cultural
Resource Preservation

Enclosure

5-41

**Advisory
Council On
Historic
Preservation**

1522 K Street, NW
Washington, DC 20005

MEMORANDUM OF AGREEMENT

WHEREAS, the Environmental Protection Agency (EPA) has determined that issuance of a National Pollutant Discharge Elimination System permit to the Dolet Hills Lignite Venture, for the Dolet Hills Lignite Mine, will have an effect upon properties included in or eligible for inclusion in the National Register of Historic Places and has requested the comments of the Advisory Council on Historic Preservation pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. 470) and its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800).

NOW, THEREFORE, EPA, the Louisiana State Historic Preservation Officer, and the Advisory Council on Historic Preservation agree that the undertaking shall be implemented in accordance with the attached stipulations in order to take into account the effect of the undertaking on historic properties.

PROPOSAL FOR AGREEMENT

I. EPA will incorporate by reference the following conditions into the original and appropriate subsequent NPDES permits to the Dolet Hills Mining Venture (DHMV) for a surface lignite mine in De Soto Parish, near Mansfield, Louisiana:

A. Prior to ground disturbing construction activities and mining, DHMV will complete intensive cultural resources survey(s) to ensure the identification of all National Register or eligible properties that may be affected directly, or indirectly, by the subsequent mining and related activities, in accordance with the proposed quidelines for the Recovery of Scientific, Prehistoric, Historic, and Archeological Data; Methods, Standards, and Reporting Requirements, published in the Federal Register on January 28, 1977 (see attachment #1). Generally, the intensive surveys will be conducted in coordination with 5-year permit areas. DHMV will develop an investigation strategy plan in consultation with the Louisiana State Historic Preservation Officer (LASHPO), for review and approval. Unless the LASHPO notes an objection within twenty (20) working days after receipt, the survey may proceed. If the LASHPO notes an objection, the matter will be resolved before a survey proceeds.

B. DHMV shall provide sufficient documentation to the LASHPO about the historic and cultural properties identified by the survey(s) to enable the LASHPO to assess the eligibility of the property for inclusion in the National Register of Historic Places. Site forms which include locational information shall be provided to the LASHPO on a monthly basis as field survey work proceeds.

C. Should the LASHPO determine that a property does not meet the criteria for inclusion in the National Register, DHMV will identify the property on the detailed project plans and then no special protection need be afforded the property when encountered during construction or mining.

D. Should a property be found to meet the criteria for inclusion in the National Register, and where it is not possible to avoid or to protect it from subsequent construction and/or mine related activities, DHMV will, prior to any ground disturbing activity in the vicinity of the property, treat the property as follows:

1. If the property is significant (as documented in the nomination to or determination of eligibility for the National Register) primarily in the data it contains so that retrieval of the data in an appropriate manner may preserve this significance, DHMV, in consultation with the LASHPO, will develop and implement a data recovery program in accordance with the Council's Handbook for the Treatment of Archeological Properties (see attachment #2). DHMV will submit a data recovery plan to the LASHPO for review and approval prior to its implementation and prior to initiating any action that would affect the property. Unless the LASHPO notes an objection within twenty (20) working days after receipt, the plan may be implemented. If the LASHPO notes an objection, the matter will be resolved before a plan is implemented.

2. If the property is significant (as documented in the nomination to or determination of eligibility for the National Register) primarily for architectural or historical values, DHMV will consult with the LASHPO to develop a mutually acceptable program which is to be implemented by DHMV to ensure preservation, relocation, and/or recordation of the property. If the property is to be relocated or otherwise rehabilitated and preserved, the mitigation program will conform to the Secretary of the Interior's Standards for Rehabilitation.

   Prior to demolition or alteration of any such property, DHMV will record the property so that there will be a permanent record of its present appearance and its history. DHMV will first contact the Historic American Buildings Survey (HABS) and the Historic American Engineering Record (HAER) (see addresses on attachment #3) to determine what documentation is required. All documentation must be accepted in writing by the HABS and/or HAER prior to demolition or alteration of the property. DHMV will also provide copies of this documentation to the LASHPO.

E. DHMV will ensure that all survey, evaluation, data recovery, mitigation measures and monitoring will be conducted under the direct supervision of a person(s) who meet, at a minimum, the applicable professional qualifications set forth in Attachment #1. DHMV's consulting archeologist will be present during ground disturbing activities where it can be predicted that subsurface cultural material is likely to occur. DHMV's consulting archeologist will train ground disturbing equipment operators to recognize cultural properties should any occur in areas where they were not previously predicted.

F. DHMV will stop activities that would adversely affect a historic or cultural property that is discovered during construction or mining related operations until the LASHPO has been given an opportunity to inspect the property, and whatever preservation or recovery measure that is agreed upon has been completed. Two (2) working days should be allowed for this inspection.

G. DHMV will provide a draft copy of all reports to the LASHPO for review and comment. All reports of work accomplished will meet, in content and form, standards generally expected by historic preservation professionals as portrayed in Attachment #1.

H. DHMV will provide at least two (2) copies of final reports to the LASHPO. A copy of any final technical reports will also be furnished to the Archeological Service Branch of the National Park Service (see address on Attachment #3) for possible submission to the National Technical Information Service (NTIS). Any precise locational data must appear in a separate appendix and will be withheld from NTIS publication pursuant to Section 11 of the General Authorities Act of 1970, as amended (Public Law 94-453). A copy of all notes, photographs, and processed data will be furnished to the LASHPO and all artifacts recovered will remain in Louisiana at an institution approved by the LASHPO.

DHMV will ensure that all notes, photographs, negatives, and processed data (e.g. tables and maps) will be stored in good order and in a manner that makes them available for future study at an institutionn that meets the standards set forth in Attachment #1, and makes these data available for other parties' research or other appropriate purposes.

II. Upon written notice from the LASHPO or the Advisory Council that any of the conditions of this agreement are being violated, EPA, the LASHPO, and the Advisory Council shall consult to determine how the concern should be resolved.

III. If a signatory determines that the terms of this Agreement cannot be met or believes a change is necessary, the signatory shall immediately request the consulting parties to consider an amendment of the Agreement. Amendments will be executed in the same manner as the orignial Agreement.

Frances E. Phillips April 18, 1983
Environmental Protection Agency Date

Robt B DeBlieux April 4. 1983
Louisiana State Historic Preservation Officer Date

Attachments - 3

Execution of this Memorandum of Agreement evidences that EPA has afforded the Council a reasonable opportunity to comment on the issuance of a NPDES permit to Dolet Hills Lignite Venture and its effects on historic properties and that EPA has taken into account the effects of its undertaking on historic properties.

5/9/83

Acting Executive Director (date)
Advisory Council on Historic Preservation

Alexander Aldrich 5/16/83

Chairman (date)
Advisory Council on Historic Preservation

ADDRESSES

Historic American Building Survey
National Park Service
U. S. Dept. of the Interior
Washington, D.C. 20240
Attn: John Burns
202-272-3533

Historic American Engineering Record
National Park Service
U. S. Dept. of the Interior
Washington, D.C. 20240
Attn: Donald Jackson
202-272-3527

Mr. Bennie Keel
Chief Archeologist
Archeological Service Branch
National Park Service
U. S. Dept of the Interior
Washington, D.C. 20240
202-272-3754

National Park Service
Southeast Regional Office
National Register Division
75 Spring Street, S.W.
Atlanta, GA 30303

APPENDIX C

Selected LOCSMD
Surface Mining Regulations

The following pages are excerpts from the Louisiana Surface Mining Regulations (Statewide Order 29-0-1), which have been referenced in the text of the SFEIS. Referenced rules are marked with an arrow.

G1a

(4) Sequence and timing of firing holes.

(c) Description of blasting warning and site access control equipment and procedures.

(d) Description of types, capabilities, sensitivities, and locations of use of any blast monitoring equipment and procedures proposed to be used.

(e) Description of plans for recording and reporting to the regulatory authority the results of preblasting surveys, if required.

(f) Description of unavoidable hazardous conditions for which deviations from the blasting schedule will be needed under 216.65(b).

➤ **180.14 Operation Plan: Maps and Plans.** Each application shall contain maps and plans of the proposed mine plan and adjacent areas as follows:

(a) The maps and plans shall show the lands proposed to be affected throughout the operation and any change in a facility or feature to be caused by the proposed operations, if the facility or feature was shown under 179.24-179.25.

(b) The following shall be shown for the proposed permit area unless specifically required for the mine plan area or adjacent area by the requirements of this Section:

(1) Buildings, utility corridors and facilities to be used.

(2) The area of land to be affected within the proposed mine plan area, according to the sequence of mining and reclamation.

(3) Each area of land for which a performance bond or other equivalent guarantee will be posted under Subchapter J.

(4) Each coal storage, cleaning and loading area.

(5) Each topsoil, spoil, coal waste, and non-coal waste storage area.

(6) Each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used.

(7) Each air pollution collection and control facility.

(8) Each source of waste and each waste disposal facility relating to coal processing or pollution control.

(9) Each facility to be used to protect and enhance fish and wildlife and related environmental values.

(10) Each explosive storage and handling facility.

(11) Location of each sedimentation pond, permanent water impoundment, coal processing waste bank, and coal processing waste dam and embankment, in accordance with 180.25, and fill area for the disposal of excess spoil in accordance with 180.35.

(c) Maps, plans and cross-sections required under paragraphs (b)(4), (5), (10), and (11) of this Section shall be prepared by, or under the direction of and certified by a qualified registered professional engineer, or professional geologist, with assistance from experts in related fields such as land surveying and landscape architecture, except that maps, plans, and cross-sections for sedimentation ponds may only be prepared by a qualified registered professional engineer; and spoil disposal facilities, maps, plans, and cross-sections may only be prepared by a qualified registered professional engineer.

180.15 Air Pollution Control Plan. The application shall contain an air pollution control plan which includes the following:

(a) An air quality monitoring program, if required by the Office, to provide sufficient data to evaluate the effectiveness of the fugitive dust control practices under Paragraph (b) of this Section to comply with applicable federal and state air quality standards.

(b) A plan for fugitive dust control practices, as required under 216.95.

➤ **180.16 Fish and Wildlife Plan.**

(a) Each application shall contain a fish and wildlife plan, consistent with 216.97 which provides:

(1) A statement of how the plan will minimize disturbances and adverse impacts on fish and wildlife and related environmental values during surface coal mining and reclamation operations, and how enhancement of these resources will be achieved, where practicable. The plan shall cover the mine plan area and portions of adjacent areas as determined by the Office pursuant to Section 179.20(c).

(2) If the applicant states that it will not be practicable, in accordance with Paragraph (1), to achieve a condition which clearly shows a trend toward enhancement of fish and wildlife resources at the time revegetation has been successfully completed under 216.111-216.117, a statement shall be provided which establishes, to the satisfaction of the Office, why it is not practicable to achieve such a condition.

(b) A statement explaining how the applicant will utilize impact control measures, management techniques, and monitoring methods to protect or enhance the following, if they are to be affected by the proposed activities:

(1) Threatened or endangered species of plants or animals listed by the Secretary of the Interior under the Endangered Species Act of 1973, as amended (16 U.S.C. Sec. 1531 et seq.) and their critical habitats.

(2) Species such as eagles, migratory birds or other animals protected by state or federal law, and their habitats; or other species identified through the consultation process pursuant to Section 179.20.

(3) Habitats of unusually high value for fish and wildlife, such as wetlands, riparian areas, cliffs supporting raptors, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

180.18 Reclamation Plan: General Requirements.

(a) Each application shall contain a plan for reclamation of the lands within the proposed permit area, showing how the applicant will comply with Section 915 of the Act, Subchapter K of these regulations, and the environmental protection performance standards of the regulatory program. The plan shall include, at a minimum, all information required under 180.18-180.37.

(b) Each plan shall contain the following information for the proposed permit area:

(1) A detailed timetable for the completion of each major step in the reclamation plan.

(2) A detailed estimate of the cost of reclamation of the proposed operations required to be covered by a performance bond under Subchapter J with supporting calculations for the estimates.

(3) A plan for backfilling, soil stabilization, compacting, and grading, with contour maps or cross sections that show the anticipated final surface configuration of the proposed permit area, in accordance with 216.101-216.106.

(4) A plan for removal, storage, and redistribution of topsoil, subsoil, and other material to meet the requirements of 216.21-216.25.

(5) A plan for revegetation as required in 216.111-216.117, including, but not limited to, descriptions of the:

(i) Schedule of revegetation.

(ii) Species and amounts per acre of seeds and seedlings to be used.

(iii) Methods to be used in planting and seeding.

(iv) Mulching techniques.

(v) Irrigation, if appropriate, and pest and disease control measures, if any.

(vi) Measures proposed to be used to determine the success of revegetation as required in 216.116.

(vii) A soil testing plan for evaluation of the results of topsoil handling and reclamation procedures related to revegetation.

(6) A description of the measures to be used to maximize the use and conservation of the coal resource as required in 216.59.

(7) A description of measures to be employed to ensure that all debris, acid-forming and toxic-forming materials, and materials constituting a fire hazard are disposed of in accordance with 216.89 and 216.103 and a description of the contingency plans which have been developed to preclude sustained combustion of such materials.

(8) A description, including appropriate cross sections and maps, of the measures to be used to seal or manage mine openings, and to plug, case, or manage exploration holes, other bore holes, wells, and other openings within the proposed permit area, in accordance with 216.13-216.15.

(9) A description of steps to be taken to comply with the requirements of the Clean Air Act (42 U.S.C. Sec. 7401 et seq.), the Clean Water Act (33 U.S.C. Sec. 1251 et seq.), and other applicable air and water quality laws and regulations and health and safety standards.

➤ 180.21 Reclamation Plan: Protection of Hydrologic Balance.

(a) Each plan shall contain a detailed description, with appropriate maps and cross section drawings, of the measures to be taken during and after the proposed surface mining activities, in accordance with Part 216, to ensure the protection of:

(1) The quality of surface and ground water systems, both within the proposed mine plan and adjacent areas, from the adverse effects of the proposed surface mining activities.

(2) The rights of present users of surface and ground water.

(3) The quantity of surface and ground water both within the proposed mine plan area and adjacent area from adverse effects of the proposed surface mining activities, or to provide alternative sources of water in accordance with 179.17 and 216.54, where the protection of quantity cannot be ensured.

(b) The description shall include:

(1) A plan for the control, in accordance with Part 216, of surface and ground water drainage into, through and out of the proposed mine plan area.

(2) A plan for the treatment, where required under these regulations, of surface and ground water drainage from the area to be disturbed by the proposed activities, and proposed quantitative limits on pollutants in discharges subject to 216.42, according to the more stringent of the following: subchapter K; or other applicable state and federal laws.

(3) A plan for the restoration of the approximate recharge capacity of the mine plan area in accordance with 216.51.

(4) A plan for the collection, recording, and reporting of ground and surface water quality and quantity data, according to 216.52.

(c) The description shall include a determination of the probable hydrologic consequences of the proposed surface mining activities, on the proposed mine plan area and adjacent area, with respect to the hydrologic regime and the quantity and quality of water in surface and ground water systems under all seasonal conditions, including the contents of dissolved and total suspended solids, total iron, pH, total manganese, and other parameters required by the Office.

➤ 180.23 Reclamation Plan: Postmining Land Uses.

(a) Each plan shall contain a detailed description of the proposed use, following reclamation of the land within the proposed permit area including a discussion of the utility and capacity of the reclaimed land to support a variety of alternative uses, and the relationship of the proposed use to existing land use policies and plans. This description shall explain:

(1) How the proposed postmining land use is to be achieved and the necessary support activities which may be needed to achieve the proposed land use.

(2) Where range or grazing is the proposed postmining use, the detailed management plans to be implemented.

(3) Where a land use different from the pre-mining land use is proposed, all materials needed for approval of the alternative use under 216.133.

(4) The consideration which has been given to making all of the proposed surface mining activities consistent with surface owner plans and applicable state and local land use plans and programs.

SUBCHAPTER J — BOND AND INSURANCE REQUIREMENTS FOR SURFACE COAL MINING AND RECLAMATION OPERATIONS

PART 200 — GENERAL REQUIREMENTS FOR BONDING OF SURFACE COAL MINING AND RECLAMATION OPERATIONS UNDER REGULATORY PROGRAM

➤ 200.11 Requirement to File a Bond.

(a) After an application for a new revised or renewed permit to conduct surface coal mining and reclamation operations has been approved under Subchapter G, but before such permit is issued, the applicant shall file with the Office a performance bond payable to the Office. The performance bond will be conditioned upon the faithful performance of all the requirements of the Act, these regulations and the provisions of the reclamation plan and permit. The amount, duration, form, conditions and terms of the performance bond shall conform to Parts 205 and 206.

(b) An operator shall not disturb surface acreage or extend any operations prior to receipt of approval from the Office of the performance bond covering the surface acreage to be affected.

(1) Liability on the performance bond shall cover all surface coal mining and reclamation operations to be conducted within the permit area during the life of the mine. After the amount of the bond has been determined for the permit area in accordance with Part 205, the permittee or applicant may either file:

(i) The entire performance bond required during the term of the permit; or

(ii) An incremental bond schedule and the new performance bond required for the first increment in the schedule.

(2) When the operator elects to increment the amount of the performance bond during the term of the permit, he shall identify the initial and successive incremental areas for bonding on the permit application map submitted for approval as provided in Section 180.14, and shall specify the proportion of the total bond amount required for the term of the permit which will be filed prior to commencing operations on each incremental area. The schedule amount of each performance bond increment shall be filed in the sequence approved in the permit, and shall be filed with the Office at least thirty days prior to the commencement of surface coal mining and reclamation operations in the next incremental area.

(c) The amount, duration, form, conditions and terms of the performance bond shall conform to Parts 205 and 206.

➤ **207.12 Criteria and Schedule for Release of Performance Bond.**

(a) The Office shall not release any liability under performance bonds until it finds that the permittee has met the requirements of the applicable reclamation phase as defined in paragraph (e) of this Section. The Office may release portions of the liability under performance bonds applicable to a permit following completion of reclamation phases on the entire permit area or on incremental areas within the permit area which have been designated in the approved reclamation plan.

(b) The maximum liability under performance bonds applicable to a permit which may be released at any time prior to the release of all acreage from the permit area shall be calculated by multiplying the ratio between the acreage on which a reclamation phase has been completed and the total acreage in the permit area, times the total liability under performance bonds applicable to a permit, times:

(1) Six-tenths, if reclamation phase I has been completed.

(2) One-fourth, if reclamation phase II has been completed.

(c) Acreage may be released from the permit area only after reclamation phase III has been completed. The maximum performance bond liability applicable to a permit which may be released at any time prior to the completion of reclamation phase III on the entire permit area shall be calculated by multiplying the ratio between the acreage on which reclamation phase III has been completed and the total acreage in the permit area, times the total liability under performance bonds applicable to a permit, times 0.15.

(d) The Office shall not release any liability under the performance bonds applicable to a permit if such release would reduce the total remaining liability under performance bonds to an amount less than that necessary for the Office to complete the approved reclamation plan, achieve compliance with the requirements of the Act, these regulations, or the permit, and abate any significant environmental harm to air, water or land resources or danger to the public health and safety which might occur prior to the release of all lands from the permit area. Where the permit includes an alternative postmining land use plan approved pursuant to Section 216.133 or 217.133, the regulatory authority shall also retain sufficient liability for the regulatory authority to complete any additional work which would be required to achieve compliance with the general standards for revegetation in Section 216.116(b)(3) or 217.116(b)(3) in the event the permittee fails to implement the approved alternative postmining land use plan within the two years required by Section 216.116(b)(3)(ii), or 217.116(b)(3)(ii).

(e) For the purposes of this Part:

(1) Reclamation phase I shall be deemed to have been completed when the permittee completes backfilling, topsoil replacement, regrading, and drainage control in accordance with the approved reclamation plan.

(2) Reclamation phase II shall be deemed to have been completed when:

(i) Revegetation has been established in accordance with the approved reclamation plan and the standards for the success of revegetation are met.

(ii) The lands are not contributing suspended solids to stream flow or runoff outside the permit area in excess of the requirements of Section 915B(10) of Title 30, La. Revised Statutes, Subchapter K of these regulations or the permit; and

(iii) With respect to prime farmlands, soil productivity has been returned to the level of yield as required by Section 185.17 and Part 223 when compared with non-mined prime farmland in the surrounding area as determined from the soil survey performed under Section 207(b)(16) of the Act and the plan approved under Section 185.17.

(iv) The provisions of a plan approved by the Office for the sound future management of any permanent impoundment by the permittee or landowner have been implemented to the satisfaction of the Office.

(3) Reclamation phase III will be deemed to have been completed when the permittee has successfully completed all surface coal mining and reclamation operations in accordance with the approved reclamation plan, including the implementation of any alternative land use plan approved pursuant to Section 216.133 or 217.133 and achieve compliance with the requirements of the Act, this Chapter, the regulatory program, the permit, and the applicable liability period under Section 215(b)(20) of the Act and Section 205.13(b) of this Subchapter has expired.

PART 208 — PERFORMANCE BOND FORFEITURE CRITERIA AND PROCEDURES

208.11 General.

(a) The Office shall forfeit all or part of a bond for any permit where required or authorized by Section 208.13.

(b) The Office may withhold forfeiture, if the permittee and surety, if applicable, agree to a compliance schedule to comply with the violations of the permit or bond conditions.

measures for these diversions may include, but not be limited to, maintenance of appropriate gradients, channel lining, revegetation, roughness structures, and detention basins.

(d) No diversion shall be located as to increase the potential for land slides. No diversions shall be constructed on existing land slides, unless approved by the Office.

(e) When no longer needed, each temporary diversion shall be removed and the affected land regraded, topsoiled, and revegetated in accordance with Sections 216.24, 216.25, 216.101-216.106, and 216.111-216.117.

(f) Diversion design shall incorporate the following:

  (1) Channel lining shall be designed using standard engineering practices to pass safely the design velocities. Riprap shall comply with the requirements of Section 216.72(b)(5), except for sand and gravel.

  (2) Freeboard shall be no less than 0.3 feet. Protection shall be provided for transition of flows and for critical areas such as swales and curves. Where the area protected is a critical area as determined by the regulatory authority, the design freeboard may be increased.

  (3) Energy dissipators shall be installed when necessary at discharge points, where diversions intersect with natural streams and exit velocity of the diversion ditch flow is greater than that of the receiving stream.

  (4) Excess excavated material not necessary for diversion channel geometry or regrading of the channel shall be disposed of in accordance with Sections 216.71-216.74.

  (5) Topsoil shall be handled in compliance with Sections 216.21-216.25.

(g) Diversions shall not be constructed or operated to divert water into underground mines without approval of the Office under Section 216.55.

➤ 216.44 Hydrologic Balance: Stream Channel Diversion.

(a) Flow from perennial and intermittent streams within the permit area may be diverted, if the diversions:

  (1) Are approved by the Office after making the findings called for in Section 216.57(a).

  (2) Comply with other requirements of this Subchapter.

  (3) Comply with local, state and federal statutes and regulations.

(b) When streamflow is allowed to be diverted, the stream channel diversion shall be designed, constructed, and removed, in accordance with the following:

(1) The longitudinal profile of the stream, the channel, and the floodplain shall be designed and constructed to remain stable and to prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow or to runoff outside the permit area. These contributions shall not be in excess of requirements of state or federal law. Erosion control structures such as channel lining structures, retention basins, and artificial channel roughness structures shall be used in diversions only when approved by the Office as being necessary to control erosion. These structures shall be approved for permanent diversions only where they are stable and will require infrequent maintenance.

(2) The combination of channel, bank, and floodplain configurations shall be adequate to pass safely the peak runoff of a ten-year, 24-hour precipitation event for temporary diversions, a one hundred-year, 24-hour precipitation event for permanent diversions, or larger events specified by the Office. However, the capacity of the channel itself should be at least equal to the capacity of the unmodified stream channel immediately upstream and downstream of the diversion.

(c) When no longer needed to achieve the purpose for which they were authorized, all temporary stream channel diversions shall be removed and the affected land regraded and revegetated, in accordance with Sections 216.24, 216.25, 216.101-216.105, and 216.111-216.117. At the time diversions are removed, downstream water treatment facilities previously protected by the diversion shall be modified or removed to prevent overtopping or failure of the facilities. This requirement shall not relieve the person who conducts the surface mining activities from maintenance of a water treatment facility otherwise required under this Part or the permit.

(d) When permanent diversions are constructed or string channels restored, after temporary diversions, the operator shall:

(1) Restore, enhance where practicable, or maintain natural riparian vegetation on the banks of the stream.

(2) Establish or restore the stream to its natural meandering shape of an environmentally acceptable gradient, as determined by the Office.

(3) Establish or restore the stream to a longitudinal profile and cross section, including aquatic habitats (usually a pattern of ripples, pools, and drops rather than uniform depth) that approximate premining stream channel characteristics.

216.55 Hydrologic Balance: Discharge of Water Into an Underground Mine. Surface water shall not be diverted or otherwise discharged into underground mine workings, unless the person who conducts the surface mining activities demonstrates to the Office that this will:

(a) Abate water pollution or otherwise eliminate public hazards resulting from surface mining activities; and

(b) Be discharged as a controlled flow, meeting the effluent limitations of Section 216.42 for pH and total suspended solids, except that the pH and total suspended solid limitations may be exceeded, if approved by the Office, and is limited to:

(1) Coal processing waste;

(2) Fly ash from a coal-fired facility;

(3) Sludge from an acid mine drainage treatment facility;

(4) Flue gas desulfurization sludge;

(5) Inert materials used for stabilizing underground mines; or

(6) Underground mine development wastes.

(c) In any event, the discharge from underground mines to surface waters will not cause, result in or contribute to a violation of applicable water quality standards or effluent limitations;

(d) Minimizes disturbance to the hydrologic balance; and

(e) Meets with the approval of the Mine Safety and Health Administration.

216.56 Hydrologic Balance: Postmining Rehabilitation of Sedimentation Ponds, Diversions, Impoundments, and Treatment Facilities. Before abandoning the permit area, the person who conducts the surface mining activities shall renovate all permanent sedimentation ponds, diversions, impoundments, and treatment facilities to meet criteria specified in the detailed design plan for the permanent structures and impoundments.

➤ **216.57 Hydrologic Balance: Stream Buffer Zones.**

(a) No land within one hundred feet of a perennial stream or a stream with a biological community determined according to paragraph (c) below shall be disturbed by surface mining activities, except in accordance with Sections 216.43-216.44, unless the Office specifically authorizes surface mining activities closer to or through such a stream upon finding:

(1) That the original stream channel will be restored.

(2) During and after the mining, the water quantity and quality from the stream section within one hundred feet of the surface mining activities shall not be adversely affected.

(b) The area not to be disturbed shall be designated a buffer zone and marked as specified in Section 216.11.

(c) A stream with a biological community shall be determined by the existence in the stream at any time of an assemblage of two or more species of anthropods or mulluscan animals which are:

(1) Adapted to flowing water for all or part of their life cycle.

(2) Dependent upon a flowing water habitat.

(3) Reproducing or can reasonably be expected to reproduce in the water body where they are found.

(4) Longer than two millimeters at some stage of the part of their life cycle spent in the flowing water habitat.

216.59 Coal Recovery. Surface mining activities shall be conducted so as to maximize the utilization and conservation of the coal, while utilizing the best appropriate technology currently available to maintain environmental integrity, so that reaffecting the land in the future through surface coal mining operations is minimized.

216.61 Use of Explosives: General Requirements.

(a) Each person who conducts surface mining activities shall comply with all applicable state and federal laws in the use of explosives.

(b) Blasts that use more than five pounds of explosive or blasting agent shall be conducted according to the schedule required by Section 216.64.

(c) All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved. Each person responsible for blasting operations shall possess a valid certification as required by Section 259.

216.62 Use of Explosives: Pre-Blasting Survey.

(a) On the request to the Office by a resident or owner of a dwelling or structure that is located within one-half mile of any part of the permit area, the person who conducts the surface mining activities shall promptly conduct a pre-blasting survey of the dwelling or structure and promptly submit a report of the survey to the Office and to the person requesting the survey. If a structure is renovated or added to, subsequent to a pre-blast survey, then upon request to the regulatory authority, a survey of such additions and renovations shall be performed in accordance with this Section.

(b) The survey shall determine the condition of the dwelling or structure and document any pre-blasting damage and other physical factors that could reasonably be affected by the blasting. Assessments of structures such as pipes, cables, transmission lines, and wells and other water systems shall be limited to surface condition and readily available data. Special

(13) Planting of special windbreak vegetation at critical points in the permit area.

(14) Control of dust from drilling, using water sprays, hoods, dust collectors, or other controls.

(15) Restricting the areas to be blasted at any one time to reduce fugitive dust.

(16) Restricting activities causing fugitive dust during periods of air stagnation.

(17) Extinguishing any areas of burning or smoldering coal and periodically inspecting for burning areas whenever the potential for spontaneous combustion is high.

(18) Reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization.

(19) Restricting fugitive dust at spoil and coal transfer and loading points with water sprays, negative pressure systems and baghouse filters, chemicals, or other practices.

(c) Additional measures. Where the Office determines that application of fugitive dust control measures listed in paragraph (b) of this Section is inadequate, the Office may require additional measures and practices as necessary.

(d) Monitoring. Air monitoring equipment shall be installed and monitoring shall be conducted in accordance with the air monitoring plan required under 180.15 and approved by the Office.

➤ 216.97 Protection of Fish, Wildlife, and Related Environmental Values.

(a) Any person conducting surface mining activities shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impact of the activities on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable.

(b) A person who conducts surface mining activities shall promptly report to the Office the presence in the permit area of any critical habitat of a threatened or endangered species listed by the Secretary of the Interior, any plant or animal listed as threatened or endangered by the State, or any bald or golden eagle, of which that person becomes aware and which was not previously reported to the Office by that person.

(c) A person who conducts surface mining activities shall insure that the design and construction of electric power lines and other transmission facilities used for or incidental to the surface mining activities on the permit area are in accordance with the guidelines set forth in Environmental Criteria for Electric Transmission System (USDI, USDA (1970)), or in alternative guidance manuals approved by the Office. Distribution lines shall be designed and constructed in accordance with ERA Bulletin 61-10, Powerline Contacts by Eagles and Other Large Birds, or in alternative guidance manuals approved by the Office. For information purposes, these two documents are available at the OSM Office, United States Department of the Interior, South Interior Building, Washington, D.C. 20240, at each OSM Regional Office, District Office, and Field Office, and at the Central Office of the Office of Conservation.

(d) Each person who conducts surface mining activities shall, to the extent possible using the best technology currently available:

(1) Locate and operate haul and access roads so as to avoid or minimize impacts to important fish and wildlife species or other species protected by state and federal laws.

(2) Fence roadways where specified by the Office to guide locally important wildlife to roadway underpasses. No new barrier shall be created in known and important wildlife migration routes.

(3) Fence, cover, or use other appropriate methods to exclude wildlife from ponds which contain hazardous concentrations of toxic-forming materials.

(4) Restore, enhance where practicable or avoid disturbance to habitats of unusually high value for fish and wildlife.

(5) Restore, enhance where practicable, or maintain natural riparian vegetation on the banks of streams, lakes, and other wetland areas.

(6) Afford protection to aquatic communities by avoiding stream channels as required in Section 216.57 or restoring stream channels as required in Section 216.44.

(7) Not use persistent pesticides on the area during surface mining and reclamation activities, unless approved by the Office.

(8) To the extent possible prevent, control, and supress range, forest, and coal fires which are not approved by the Office as part of a management plan.

(9) If fish and wildlife habitat is to be a primary or secondary postmining land use, the operator shall in addition to the requirements of Sections 216.111-216.117:

(i) Select plant species to be used on reclaimed areas, based on the following criteria:

(A) Their proven nutritional value for fish and wildlife.

(B) Their uses as cover for fish and wildlife.

(C) Their ability to support and enhance fish and wildlife habitat after release of bonds.

(ii) Distribute plant groupings to maximize benefit to fish and wildlife. Plants should be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits for fish and wildlife.

(10) Where cropland is to be the alternative postmining land use on lands diverted from a fish and wildlife premining land use and where appropriate for wildlife and crop management practices, intersperse the fields with trees, hedges, or fence rows throughout the harvested area to break up large blocks of monoculture and to diversify habitat types for birds and other animals. Wetlands shall be preserved or created rather than drained or otherwise permanently abolished.

(11) Where the primary land use is to be residential, public service, or industrial land use, intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs and trees useful as food and cover for birds and small animals, unless such greenbelts are inconsistent with the approved postmining land use.

216.99 Slides and Other Damage.

(a) An undisturbed natural barrier shall be provided beginning at the elevation of the lowest coal seam to be mined and extending from the outslope for such distance as may be determined by the Office as is needed to assure stability. The barrier shall be retained in place to prevent slides and erosion.

(b) At any time a slide occurs which may have a potential adverse affect on public property, health, safety, or the environment, the person who conducts the surface mining activities shall notify the Office by the fastest available means and comply with any remedial measures required by the Office.

216.100 Contemporaneous Reclamation. Reclamation efforts, including, but not limited to, backfilling, grading, topsoil replacement and revegetation, of all land disturbed by surface mining activities shall occur as contemporaneously as practicable with mining operations.

216.101 Backfilling and Grading: General Requirements.

(a) Timing of backfilling and grading.

(1) Contour mining. Rough backfilling and grading shall follow removal by not more than sixty days or one thousand five

(1) Haul or convey, backfill, and grade all spoil and wastes, not required to achieve the approximate original contour of the mine plan area, to the lowest practicable grade, to achieve a static factor of safety of 1.3 and cover all acid-forming and other toxic-forming materials.

(2) Haul or convey, backfill, and grade excess spoil and wastes only within the permit area and dispose of such materials in accordance with Sections 216.71-216.74.

(3) Haul or convey, backfill, and grade excess spoil and wastes to maintain the hydrologic balance, in accordance with Sections 216.41-216.57 and to provide long-term stability by preventing slides, erosion and water pollution.

(4) Haul or convey, backfill, grade, and revegetate wastes and excess spoil to achieve an ecologically sound land use approved by the Office as compatible with the prevailing land uses in unmined areas surrounding the mine plan area.

(5) Eliminate all highwalls and depressions by backfilling with spoil and suitable waste materials; and

(6) Meet the revegetation requirements of Sections 216.111-216.117 for all disturbed areas.

216.106 Regrading or Stabilizing Rills and Gullies. When rills and gullies deeper than nine inches form in areas that have been regraded and topsoiled, the rills and gullies shall be filled, graded, or otherwise stabilized and the area reseeded or replanted according to Sections 216.111-216.117. The Office shall specify that rills or gullies of lesser size be stabilized and the area reseeded or replanted if the rills or gullies are disruptive to the approved postmining land use or may result in additional erosion and sedimentation.

➤ **216.111 Revegetation: General Requirements.**

(a) Each person who conducts surface mining activities shall establish on all affected land a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of disturbed land or species that supports the approved postmining land use. For areas designated as prime farmland, the requirements of Section 223 shall apply.

(b) All revegetation shall be in compliance with the plans submitted under Section 180.18 and 180.23, as approved by the Office in the permit, and carried out in a manner that encourages a prompt vegetative cover and recovery of productivity levels compatible with the approved postmining land use.

(1) All disturbed land, and water areas and surface areas of roads that are approved as a part of the postmining land use, shall be seeded or planted to achieve a permanent vegetative cover of the same seasonal variety native to the area of disturbed land.

(2) The vegetative cover shall be capable of stabilizing the soil surface from erosion.

(3) Vegetative cover shall be considered of the same seasonal variety when it consists of a mixture of species of equal or superior utility for the approved postmining land use, when compared with the utility of naturally occurring vegetation during each season of the year.

(4) If both the premining and postmining land uses are cropland, planting of the crops normally grown will meet the requirements of paragraph (b)(1) of this Section.

➤ **216.112 Revegetation: Use of Introduced Species.** Introduced species, may be substituted for native species only if approved by the Office under the following conditions:

(a) After appropriate field trials have demonstrated that the introduced species are desirable and necessary to achieve the approved postmining land use.

(b) The species are necessary to achieve a quick, temporary, and stabilizing cover that aids in controlling erosion; and measures to establish permanent vegetation are included in the approved plan submitted under Sections 180.18(b)(3) and 180.23.

(c) The species are compatible with the plant and animal species of the region.

(d) The species meet the requirements of applicable state and federal seed or introduced species statutes and are not poisonous or noxious.

(e) The species utilized are not Kudzu, pueraria lobata, or any vine of the Kudzu family.

216.113 Revegetation: Timing. Seeding and planting of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final preparation. The normal period for favorable planting shall be that planting time generally accepted locally for the type of plant materials selected. When necessary to effectively control erosion, any disturbed area shall be seeded and planted, as contemporaneously as practicable with the completion of backfilling and grading, with a temporary cover of small grains, grasses, or legumes until a permanent cover is established.

216.114 Revegetation: Mulching and Other Soil Stabilizing Practices.

(a) Suitable mulch and other soil stabilizing practices shall be used on all regraded and topsoiled areas to control erosion, promote germination of seeds, or increase the moisture retention capacity of the soil. The Office may, on a case-by-case basis, suspend the requirement for mulch, if the permittee can demonstrate that alternative procedures will achieve the requirements of 216.116 and do not cause or contribute to air or water pollution.

(c) The person who conducts surface mining activities shall:

(1) Maintain any necessary fences and proper management practices.

(2) Conduct periodic measurements of vegetation, soils, and water prescribed or approved by the Office, to identify conditions during the applicable period of liability specified in paragraph (b) of this Section.

(d) For permit areas forty acres or less in size, the following performance standards, if approved by the Office, may be used instead of reference areas to measure success of revegetation on sites that are disturbed. These standards shall be met for a minimum of five full consecutive years.

(1) Areas planted only in herbaceous species shall sustain a vegetative ground cover of seventy percent for five full consecutive years.

(2) Areas planted with a mixture of herbaceous and woody species shall sustain a herbaceous vegetative ground cover of seventy percent for five full consecutive years and four hundred woody plants per acre after five years. On steep slopes, the minimum number of woody plants shall be six hundred per acre.

(3) For purposes of this Section, herbaceous species means grasses, legumes, and nonleguminous herbs; woody plants means woody shrubs, trees and vines; and ground cover means the area of ground covered by the combined aerial parts of vegetation and the litter that is produced naturally onsite, expressed as a percentage of the total area of measurement.

➤ **216.117 Revegetation: Tree and Shrub Stocking for Forest Land.** This Section sets forth forest resource conservation standards for reforestation operations to ensure that a cover of commercial tree species, noncommercial tree species, shrubs or halfshrubs, sufficient for adequate use of the available growing space, is established after surface mining activities.

(a) Stocking, i.e., the number of stems per unit area, will be used to determine the degree to which space is occupied by well distributed, countable trees, shrubs or halfshrubs.

(1) Root crown or root sprouts over one foot in height shall count as one toward meeting the stocking requirements. Where multiple stems occur only the tallest stem will be counted.

(2) A countable tree or shrub means a tree that can be used in circulating the degree of stocking under the following criteria:

(i) The tree or shrub shall be in place at least two growing seasons.

(ii) The tree or shrub shall be alive and healthy.

(iii) The tree or shrub shall have at least one-third of its length in live crown.

(3) Rock areas, permanent road and surface water drainage ways on the revegetated area shall not require stocking.

(b) The following are the minimum performance standards for areas where commercial forest land is the approved postmining land use:

(1) The area shall have a minimum stocking of four hundred fifty trees or shrubs per acre.

(2) A minimum of seventy-five percent of countable trees or shrubs shall be commercial trees species.

(3) The number of trees or shrubs and the ground cover shall be determined using procedures described in Sections 216.116(b)(2)(iv) and 216.117(a), and the sampling method approved by the Office; when the stocking is equal to or greater than four hundred fifty trees or shrubs per acre and there is acceptable ground cover, the five year responsibility period required in Section 216.116(b) shall begin.

(4) Upon expiration of the five year responsibility period, and at the time of request for bond release, each permittee shall provide documentation showing that the stocking of trees and shrubs and the ground cover on the revegetated area satisfy Sections 216.116(b)(2)(iv) and 216.117(c)(i).

(c) The following are the minimum performance standards for areas where woody plants are used for wildlife management, recreation, shelter belts, or forest uses other than commercial forest land:

(1) An inventory of trees, halfshrubs and shrubs shall be conducted on established reference areas according to methods approved by the Office, this inventory shall contain, but not be limited to site quality; stand size; stand condition; site and species relations; and appropriate forest land utilization considerations.

(2) The stocking of trees, shrubs, halfshrubs and the ground cover established on the revegetated area shall approximate the stocking and ground cover on the reference area and shall utilize local and regional recommendations regarding species composition, spacing and planting arrangement. The stocking of live woody plants shall be equal to or greater than ninety percent of the stocking of woody plants of the same life form on the reference area. When this require-

ment is met and acceptable ground cover is achieved, the five year responsibility period required in Section 216.116(b) shall begin.

(3) Upon expiration of the five year responsibility period and at the time of request for bond release, each permittee shall provide documentation showing that:

(i) The woody plants established on the revegetated site are equal to or greater than ninety percent of the stocking of live woody plants of the same life form of the approved reference areas with eighty percent statistical confidence.

(ii) The ground cover on the revegetated area satisfies Section 216.116(b)(2)(iv). Species diversity, seasonal variety and regenerative capacity of the vegetation of the revegetated area shall be evaluated on the basis of the results which could reasonably be expected using the revegetation methods described in the mining and reclamation plan.

216.131 Cessation of Operations: Temporary.

(a) Each person who conducts surface mining activities shall effectively secure surface facilities in areas in which there are no current operations, but in which operations are to be resumed under an approved permit. Temporary abandonment shall not relieve a person of their obligation to comply with any provisions of the approved permit.

(b) Before temporary cessation of mining and reclamation operations for a period of thirty days or more, or as soon as it is known that a temporary cessation will extend beyond thirty days, persons who conduct surface mining activities shall submit to the Office a notice of intention to cease or abandon mining and reclamation operations. This notice shall include a statement of the exact number of acres which will have been affected in the permit area, prior to such temporary cessation, the extent and kind of reclamation of those areas which will have been accomplished and identification of the backfilling, regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

216.132 Cessation of Operations: Permanent.

(a) Persons who cease surface mining activities permanently shall close or backfill or otherwise permanently reclaim all affected areas, in accordance with these regulations and the permit approved by the Office.

(b) All underground openings, equipment, structures, or other facilities not required for monitoring, unless approved by the Office as suitable for the postmining land use or environmental monitoring, shall be removed and the affected land reclaimed.

216.176 Roads: Class III — Restoration. Immediately after a Class III Road is no longer needed for operations, reclamation, or monitoring:

(a) The road shall be closed to vehicular traffic.

(b) The natural drainage patterns shall be restored.

(c) All bridges and culverts shall be removed.

(d) Roadbeds shall be ripped, plowed, and scarified.

(e) Fill slopes shall be rounded or reduced and shaped to conform the side to adjust terrain and meet natural-drainage restoration standards.

(f) Cut slopes shall be reshaped to blend with the natural contour.

(g) Cross drains, dikes, and water bars shall be constructed to control erosion.

(h) Road surfaces from which topsoil has been removed shall be covered with topsoil in accordance with Section 216.24(b), and the surface shall be revegetated in accordance with Sections 216.111-216.116.

➤ **216.180 Other Transportation Facilities.** Railroad loops, spurs, sidings, surface conveyor systems, chutes, aerial tramways, or other transportation facilities shall be designed, constructed or reconstructed, and maintained and the area restored, to:

(a) Prevent to the extent possible, using the best technology currently available:

  (1) Damage to fish, wildlife, and related environmental values.

  (2) Additional contributions of suspended solids to streamflow or runoff outside the permit area in excess of limitations of State or Federal law.

(b) Control and minimize diminution or degradation of water quality and quantity.

(c) Control and minimize erosion and siltation.

(d) Control and minimize air pollution.

(e) Prevent damage to public or private property.

216.181 Support Facilities and Utility Installations.

(a) Support facilities required for, or used incidentally to, the operation of the mine, including, but not limited to, mine buildings, coal loading facilities at or near the minesite, coal storage facilities, equipment-storage facilities, fan buildings, hoist buildings, preparation plants, sheds, shops, and other buildings, shall be designed, constructed or reconstructed, and located to prevent or control erosion and siltation, water

APPENDIX D

Habitat Quality Assessment
Dolet Hills Mine Project Area

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HABITAT QUALITY ASSESSMENT
DOLET HILLS MINE PROJECT AREA

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HABITAT QUALITY ASSESSMENT

1.0 INTRODUCTION

To provide a quality assessment of the basic terrestrial habitats on the Dolet Hills Lignite Mine Project area, the baseline data on breeding bird populations on the project site (EH&A, 1980c) were compared in detail to other similar data from the project region. Although a large variety of quality assessment techniques have been developed in recent years (Graber and Graber, 1976; Holling, 1978; FWS, 1978a, 1980a, 1980b; Sheffield, 1981), avian populations have received significant attention for their potential to serve as environmental quality indicators (Graber and Graber, 1976; Jarvinen and Vaisenen, 1979; Plunkett, 1979; FWS, 1979). There are numerous characteristics of birds that make them useful as indicator organisms and at least a few major problems with using data on birds. Among their advantageous characteristics: (1) birds are relatively conspicuous and easy to detect compared to other terrestrial organisms; (2) birds are widely distributed through nearly all habitats; (3) birds are highly mobile, which means that their populations may respond rather quickly to perturbations in their food supply or to alterations in their habitats; (4) because of their fat storage requirements, high metabolic rates and efficient respiratory systems, they may serve as "high-volume samplers" of toxicants in food, water, and air; and (5) bird populations are measurable and are better known than are those of most other organisms (Graber and Graber, 1976; Plunkett, 1979). Perhaps the worst characteristic of birds for their use as environmental indicators on a specified area is their aforementioned mobility, which may cause populations to change overnight both quantitatively and qualitatively (Graber and Graber, 1976). For this reason, monitoring and assessment efforts have most frequently been targeted at breeding bird populations which are more stable for a given location through time (i.e., year-to-year).

2.0 METHODS

For the present assessment, breeding bird densities, species richness, species diversities and specific composition for each of three basic habitats (bottomland forest, upland forest, and second-growth upland forest (clear-cut)) (EH&A, 1980c) were compared with 7 to 16 breeding bird censuses in similar habitats in Louisiana and adjacent states (Table 2-1). Most of the latter censuses were taken from American Birds during the period 1973-1983 (see Appendix). For clear-cuts, insufficient census data were available from this region, so comparable censuses in other southern states (Georgia, Tennessee, and Virginia) were compiled. The techniques for the breeding bird censuses published in American Birds (primarily spot-mapping) and those utilized by EH&A (variable-width transects) differ substantially (Emlen, 1971; Franzreb, 1976, 1981). However, with proper field application, both techniques should yield comparable data, especially for territorial passerines birds, with allowance for certain inherent biases during interpretation (Franzreb, 1981).

All census data were converted to birds per square kilometer for comparison. Average statistics (census areas, bird densities, number of species) were calculated for each set of non-Dolet Hills censuses. Whittaker's (1975) index, which incorporates census area into a simple measure of diversity, were calculated for all censuses. Average statistics in each habitat for the non-Dolet Hills data were compared to Dolet Hills data. Even though the a priori assumption might be made that Dolet Hills observations and other published censuses all sampled the same populations (e.g. upland forest bird populations of the region), the differing census techniques preclude the application of rigorous statistical tests on these observations. Statements below on similarity or "significant" differences in the data sets are qualitative and judgemental only. Criteria were established for classifying bird species as common and widespread in each habitat and comparisons were made of these species in the region and at Dolet Hills (Table 2-2). All results were interpreted with respect to known vegetation and land use patterns in the project

TABLE 2-1

COMPARISON OF BREEDING BIRD POPULATIONS IN PROJECT REGION[1]

	Upland Forest		Clear-cut		Bottomland Forest	
	Region	Dolet Hills	Region	Dolet Hills	Region	Dolet Hills
Sample Size	11	1	16	1	7	1
Avg. Census Area (ha)	8.4 (6.3-12.1)[2]	15.0	14.0 (6.1-20.2)	25.0	11.8 (6.5-25.0)	11.3
Avg. No. of Species	15 (9-21)	18	13 (4-21)	21	23 (16-29)	15
Avg. Density[3]	864 (320-1,268)	797	676 (316-930)	648	2,064 (1,374-3,080)	939
Avg. Diversity[4]	2.95 (1.80-4.24)	3.48	2.69 (0.81-3.96)	3.89	4.91 (4.10-5.81)	2.97

---

1. Breeding bird censuses in project region were taken from American Birds, Vols 27-37 (1973-1983), and Dickson and Segelquist (1979). Data for the Dolet Hills Project area are from EH&A (1980c).

2. Ranges of values are shown in parentheses.

3. All densities have been converted to birds per square kilometer for comparability.

4. Whittaker's diversity, d = s/log A, where s = no. of species and A = census area in square meters.

TABLE 2-2

COMPARISON OF COMMON, WIDESPREAD SPECIES[1,2]

Species	Upland Forest		Clear-cut		Bottomland Forest	
	Region	Dolet Hills	Region	Dolet Hills	Region	Dolet Hills
Yellow-billed Cuckoo	31	30			92	44
Red-bellied Woodpecker	21	9			51	-
Great Crested Flycatcher					89	-
Acadian Flycatcher	29	100			185	133
Blue Jay	47	22				
Carolina Chickadee	41	-				
Tufted Titmouse	56	67			104	15
Carolina Wren	89	30	34	15	144	44
White-eyed Vireo	155	67	59	62	189	44
Red-eyed Vireo	63	89			87	111
Prothonotary Warbler					163	111
Prairie Warbler			84	139		
Kentucky Warbler	41	-				
Yellow-breasted Chat			80	77		
Hooded Warbler	64	78				
Brown-headed Cowbird					70	-
Summer Tanager	28	44				
Northern Cardinal	193	78	38	15	175	89
Indigo Bunting			86	92		
Rufous-sided Towhee			222	-		

---

[1] Criteria for classification as a common, widespread species are as follows:
Upland Forest: recorded on 6 or more of the 11 regional censuses
Clear-cut: recorded on 9 or more of the 16 regional censuses
Bottomland Forest: recorded on 6 or more of the 7 regional censuses

[2] All data are presented in birds per square kilometer. Densities are compared only within those habitats where the species meets the above criteria as a common, widespread species.

area (Draft SEIS, Sections 5.5.1 and 5.8.1), as well as the biological characteristics of the species (Bent, 1919 et seq.; Lowery, 1974a) and successional patterns in comparable bird communities (Meyers and Johnson, 1978; Shugart et al., 1978).

3.0 RESULTS AND DISCUSSION

The most widespread habitat in the permit area, upland forests, contained avian communities very comparable to 11 other upland forest censuses in the region (Tables 2-1, 2-3, 2-4). Bird densities did not differ significantly (797 bds/km^2 in Dolet Hills versus 864 bds/km^2 in other areas) and numbers of bird species were only marginally different (18 versus 15 species); however, the somewhat larger size of the Dolet Hills upland transect (15 ha versus 8.4 ha) probably accounts for most of this difference. Whittaker's indices of diversity for the two data sets did not differ significantly (3.48 versus 2.95). Also, the spot-mapping technique will tend to exclude visiting non-breeding birds on a plot, which the variable-width transect method will not distinguish or exclude. Among 13 common, widespread upland forest species (recorded on 6 or more of the 11 regional censuses), only two species were not recorded on the EH&A census (Carolina Chickadee, Kentucky Warbler) (Table 2-2); however, both were recorded regularly elsewhere in the Dolet Hills permit area (EH&A, 1980c). Densities of all other component species were comparable (differing by a factor less than 3.0) except for the Acadian Flycatcher which was five times more abundant on the Dolet Hills plot than the other upland census areas. The Dolet Hills upland plot was adjacent to a bottomland area where the latter species is typically more numerous (Lowery, 1974a; EH&A, 1980c).

While the vegetation and land use data for the project area do not separate out varying ages of upland forest, most of the Dolet Hills uplands are in various early to mid-successional stages as a result of timber management practices. The data on "clear-cut" habitats serve as a measure of the typical starting point of this secondary succession (Shugart et al., 1978; Meyers and

TABLE 2-3

SUMMARY: UPLAND FOREST BREEDING BIRD CENSUSES

Description	State	Size (hectares)	No. of species	Birds/ sq. km.	Diversity (d)[1]	Source[2]
1. Mixed Pine-hardwood	TX	6.3	12	1,078	2.50	AB 28(6):1016, No. 59
2. Mixed Pine-hardwood	TX	6.3	11	1,108	2.29	AB 29(6):1104, No. 57
3. Mixed Pine-hardwood	TX	6.3	13	1,268	2.71	AB 31(1):53, No. 65
4. Mixed Pine-hardwood	TX	6.3	13	950	2.71	AB 32(1):72 No. 58
5. Mixed Pine-hardwood	TX	6.3	13	1,014	2.71	AB 33(1):71, No. 59
6. Pole: Pine	TX	10.0	9	320	1.80	Dickson & Segelquist (1979)
7. Pole: Pine-hardwood	TX	10.0	10	610	2.00	Dickson & Segelquist (1979)
8. Sawtimber: Pine	TX	10.0	19	750	3.80	Dickson & Segelquist (1979)
9. Sawtimber: Pine-hardwood	TX	10.0	18	740	3.60	Dickson & Segelquist (1979)
10. Loblolly Pine	LA	12.1	21	610	4.13	AB 28(6):1020-21, No. 68
11. Mixed Pine-deciduous	LA	8.9	21	1,056	4.24	AB 36(1):70, No. 71
Average:		8.4	15	864	2.95	

[1] Whittaker's Diversity Index (see Table 2-1).

[2] AB = *American Birds* (followed by volume (issue): page, census number).

TABLE 2-4

UPLAND FOREST BREEDING BIRD CENSUSES[1,2]

Species	AB 28(6): 1016	AB 29(6): 1104	AB 31(1): 53	AB 32(1): 72	AB 33(1): 71	Dickson and Segelquist (1979)				AB 28(6): 1020	AB 36(1): 70	Average Non-Dolet Hills[3]	EH&A Dolet Hills
						P-P	P-PH	S-P	S-PH				
Green-backed Heron			32	32						20		28	
Sharp-shinned Hawk											+	+	
Mourning Dove												0	9
Yellow-billed Cuckoo	32			32	64		20	20	20		+	31	30
Barred Owl												0	11
Chimney Swift												0	11
Pileated Woodpecker											45	45	9
Red-bellied Woodpecker					32		20	20		33	+	26	9
Red-headed Woodpecker						20		20		33	22	24	
Hairy Woodpecker										+	+	+	
Downy Woodpecker	32				32					17		27	
Great Crested Flycatcher						20				+		20	
Acadian Flycatcher				64	32			10	20	17		29	100
Eastern Wood-Pewee						20		20	10	33		17	
Blue Jay		96	32			10		20	40	17	112	47	22
American Crow											+	+	
Carolina Chickadee	32	96	32	64	64	20	50	30	20	+	112	45	
Tufted Titmouse	64	96	32	64	64	20	40	100	80	17	68	56	67
Brown-headed Nuthatch						60		20		66		49	
Carolina Wren	126	126	190	32	32		90	90	80	33	90	89	30
Northern Mockingbird											68	68	
American Robin											45	45	
Wood Thrush											22	22	
Eastern Bluebird										17		17	
Blue-gray Gnatcatcher								20	40			30	100
White-eyed Vireo	222	222	286	158	190		110	40	10		158	155	67
Yellow-throated Vireo										33		33	
Red-eyed Vireo		32	64	96	96		60	30	80		45	63	89

TABLE 2-4 (Concluded)

Species	AB 28(6): 1016	AB 29(6): 1104	AB 31(1): 53	AB 32(1): 72	AB 33(1): 71	Dickson and Segelquist (1979)				AB 28(6): 1020	AB 36(1): 70	Average Non-Dolet Hills[3]	Ell&A Dolet Hills
						P-P	P-PH	S-P	S-PH				
Black-and-white Warbler							60	40	50			50	
Swainson's Warbler	32	64	64	64	32						22	46	
Worm-eating Warbler									60			60	
Northern Parula	32										22	29	33
Pine Warbler						110	70	100	40	116		87	
Prairie Warbler										33		33	
Kentucky Warbler	96	32	64	32	32		20	20	30			41	
Yellow-breasted Chat											+	+	
Hooded Warbler	64	64	96	64	96				20		45	64	78
Brown-headed Cowbird		+	64	+								64	
Summer Tanager	32		32					30		17		28	44
Northern Cardinal	316	316	286	254	254		90	80	100	50	180	193	78
Indigo Bunting								40		17		29	11
Rufous-sided Towhee										33		33	
Bachman's Sparrow										33		33	
Chipping Sparrow						40						40	
Total Density	1,078	1,108	1,268	950	1,014	320	610	750	740	610	1,056	864	797
Total No. Species	12	11	13	13	13	9	10	19	18	21	21	15	18
Size (ha)	6.32	6.32	6.31	6.32	6.31	10	10	10	10	12.14	8.9	8.4	15
Diversity (d)	2.5	2.29	2.71	2.71	2.71	1.8	2.0	3.8	3.6	4.13	4.24	2.95	3.48

[1] All densities are presented as birds per square kilometer.

[2] Abbreviations:

AB = American Birds (followed by volume (issue): page, census number).
d = Whittaker's Diversity Index (see Table 2-1)
P-P = Pole: Pine
P-PH = Pole: Pine-hardwood
S-P = Sawtimber: Pine
S-PH = Sawtimber: Pine-hardwood
ha = hectares

[3] Averages presented are the average density of a species among those censuses on which it was encountered. The indicator "+" (signifying less than 0.5 territory on a given census plot) is averaged in as 0 birds per square kilometer. This method of calculation yields values slightly lower than the theoretical true means.

Johnson, 1978). Avian densities and species composition on the Dolet Hills "second growth upland forest" plot (a two- to four-year old clear-cut) were very similar to those in 16 censuses of comparable clear-cuts elsewhere in the southern United States (Tables 2-1, 2-5, 2-6). Among seven common, widespread species of clear-cuts (recorded on 9 or more of the 16 regional censuses), only the Rufous-sided Towhee was missing on the Dolet Hills plot, which is west of the normal range of that species (Lowery, 1974a) (Table 2-2). The substantial number of woodpeckers encountered on the Dolet Hills clear-cut plot (Table 2-6) is a direct result of the numerous snags and seed trees left standing on the site (EH&A, field observations), a practice which varies with different timber companies and land managers. The higher number of species on the Dolet Hills plot (21 versus an average of 13) is partly a result of the aforementioned difference in census techniques with respect to non-breeding species. For example, on the four non-Dolet Hills clear-cut censuses which made specific mention of "non-breeding visitors," an average of 15 additional species were listed (see Appendix). Also, the larger size of the Dolet Hills census area would, again, encompass more breeding species.

In the southern United States, bottomland hardwood forests typically support substantially higher densities and diversities of breeding birds than upland forests (Dickson, 1978), although there is substantial variation among bottomlands such as oak-gum forests, tupelo swamps, cypress swamps, and so forth. The bottomland transect on the Dolet Hills project area, which was a narrow stand of oak-gum forest typical of the mine area bottomlands, had significantly lower bird density, number of species and diversity than seven other bottomland censuses in the region (Tables 2-1, 2-7, 2-8), and showed a lower diversity than the Dolet Hills upland census. The density of breeding birds (939 bds/km^2) was only 45 percent of the average for the other bottomland censuses (2,064 bds/km^2) and was lower than any of the other seven censuses. Likewise, number of the species (15) was only 65 percent of the average for the censuses (23) and was the lowest value examined. The two most comparable censuses from the region (oak-gum bottomlands in east Texas and Louisiana) had 22 and 16 species, with densities of 1500-1720 bds/km^2

TABLE 2-5

SUMMARY: CLEAR-CUT BREEDING BIRD CENSUSES[1]

Description	State	Size (hectares)	No. of species	Birds/ sq. km.	Diversity (d)[2]	Source[3]
1. Deciduous Clear-cut (1-yr old)	TN	20.2	13	326	2.45	AB 29(6):1117-18, No. 90
2. Deciduous Clear-cut (2-yr old)	TN	20.2	14	316	2.63	AB 31(1):62, No. 85
3. Deciduous Clear-cut (3-yr old)	TN	20.2	17	524	3.20	AB 32(1):80, No. 79
4. Deciduous Clear-cut (4-yr old)	TN	20.2	13	602	2.45	AB 33(1):78, No. 85
5. Deciduous Clear-cut (5-yr old)	TN	20.2	19	786	3.58	AB 34(1):66, No. 83
6. Deciduous Clear-cut (6-yr old)	TN	20.2	21	894	3.96	AB 35(1):76, No. 106
7. Deciduous Clear-cut (7-yr old)	TN	20.2	21	900	3.96	AB 36(1):78, No. 103
8. Deciduous Clear-cut (8-yr old)	TN	20.2	19	890	3.58	AB 37(1):78, No. 89
9. Deciduous Clear-cut (3-yr old)	GA	6.9	8	640	1.65	AB 32(1):80, No. 81
10. Deciduous Clear-cut (4-yr old)	GA	6.9	14	930	2.89	AB 33(1):79-80, No. 89
11. Deciduous Clear-cut (5-yr old)	GA	6.9	10	726	2.01	AB 34(1):67, No. 87
12. Deciduous Clear-cut (6-yr old)	GA	6.9	9	814	1.86	AB 35(1):76, No. 109
13. Deciduous Clear-cut (2-yr old)	TN	8.1	4	420	0.81	AB 35(1):76, No. 107
14. Deciduous Clear-cut (6-yr old)	VA	6.1	7	692	1.46	AB 37(1):76, No. 83
15. Small sapling: Pine (4-yr old)	TX	10.0	12	626	3.00	Dickson & Segelquist (1978)
16. Small sapling: Pine-hardwood (6-yr old)	TX	10.0	14	720	3.50	Dickson & Segelquist (1978)
Average		14.0	13	676	2.69	

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[1] Comparable census data were gathered from other southern states due to a lack of Louisiana data.

[2] Whittaker's Diversity Index (see Table 2-1).

[3] AB = American Birds (followed by volume (issue): page, census number).

TABLE 2-6

CLEAR-CUT BREEDING BIRD CENSUSES[1,2]

Species	AB 29(6): 1117 No. 90	AB 31(1): 62 No. 85	AB 32(1): 80 No. 79	AB 33(1): 78 No. 85	AB 34(1): 66 No. 83	AB 35(1): 76 No. 106	AB 36(1): 78 No. 103	AB 37(1): 78 No. 89
Sharp-shinned Hawk						+		
Northern Bobwhite								
Mourning Dove								
Yellow-billed Cuckoo							+	10
Whip-poor-will						10	+	10
Ruby-throated Hummingbird	10	10	20	50	50	60	50	20
Northern Flicker			10					
Pileated Woodpecker					+	+	+	
Red-bellied Woodpecker								
Red-headed Woodpecker								
Downy Woodpecker		+	+		+	+		
Eastern Kingbird								
Great Crested Flycatcher								
Eastern Wood-Pewee	10	10	10					
Blue Jay								
Black-capped Chickadee								
Carolina Chickadee					10	20	10	10
Tufted Titmouse								
Brown-headed Nuthatch								
Carolina Wren	50	40					20	10
Northern Mockingbird								
Gray Catbird					10	10		10
Brown Thrasher								
Wood Thrush								10

TABLE 2-6 (Cont'd)

Species	AB 29(6): 1117 No. 90	AB 31(1): 62 No. 85	AB 32(1): 80 No. 79	AB 33(1): 78 No. 85	AB 34(1): 66 No. 83	AB 35(1): 76 No. 106	AB 36(1): 78 No. 103	AB 37(1): 78 No. 89
Eastern Bluebird								
Blue-gray Gnatcatcher	10		10	10	20	10	10	10
White-eyed Vireo		+	40	70	60	60	50	50
Yellow-throated Vireo						+		
Red-eyed Vireo	10	10	10	10	50	30	40	20
Black-and-white Warbler	10	10	10	10	20	+	20	20
Swainson's Warbler							40	
Worm-eating Warbler						10	10	10
Northern Parula					10			
Black-throated Green Warbler							+	
Chestnut-sided Warbler			10	50				
Prairie Warbler	10		30					
Kentucky Warbler		20	40	40	60	40	30	30
Common Yellowthroat					10			
Yellow-breasted Chat	40	40	60	98	98	158	108	88
Hooded Warbler	10	+	40	70	74	134	138	40
Orchard Oriole								
Common Grackle								
Brown-headed Cowbird			10	10	10	10	10	10
Scarlet Tanager	+							
Northern Cardinal	20	10	20	10	40	40	50	88
Blue Grosbeak								
Indigo Bunting	88	88	128	70	98	30	30	40
Painted Bunting								
American Goldfinch					30	20	20	

TABLE 2-6 (Cont'd)

Species	AB 29(6): 1117 No. 90	AB 31(1): 62 No. 85	AB 32(1): 80 No. 79	AB 33(1): 78 No. 85	AB 34(1): 66 No. 83	AB 35(1): 76 No. 106	AB 36(1): 78 No. 103	AB 37(1): 78 No. 89
Rufous-sided Towhee	60	70	80	108	138	256	266	248
Chipping Sparrow								
Field Sparrow								
Song Sparrow		10						
Total Density	326	316	524	602	786	894	900	890
Total No. Species	13	14	17	13	19	21	21	19
Size (ha)	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2
Diversity (d)	2.45	2.63	3.20	2.45	3.58	3.96	3.96	3.58

TABLE 2-6 (Cont'd)

Species	AB 32(1): 80 No. 81	AB 33(1): 79 No. 89	AB 34(1): 67 No. 87	AB 35(1): 76 No. 109	AB 35(1): 76 No. 107	AB 37(1): 76 No. 83	D&S 1979 SS-P	D&S 1979 SS-PH	Average Non-Dolet Hills^3	EH&A Dolet Hills
Sharp-shinned Hawk									+	
Northern Bobwhite		58	29				20		36	5
Mourning Dove	29	29	29					20	27	6
Yellow-billed Cuckoo									5	6
Whip-poor-will									7	
Ruby-throated Hummingbird									34	10
Northern Flicker									10	
Pileated Woodpecker								20	5	
Red-bellied Woodpecker								20	20	23
Red-headed Woodpecker									0	77
Downy Woodpecker								20	4	
Eastern Kingbird									0	8
Great Crested Flycatcher								20	20	26
Eastern Wood-Pewee									10	
Blue Jay								20	20	6
Black-capped Chickadee						+			+	
Carolina Chickadee		29	29	29				40	22	
Tufted Titmouse									0	9
Brown-headed Nuthatch		29						20	25	
Carolina Wren	29	29		29			42	60	34	15
Northern Mockingbird							32		32	
Gray Catbird					25	+			11	19
Brown Thrasher	29	29	29	29					29	
Wood Thrush									10	

TABLE 2-6 (Cont'd)

Species	AB 32(1): 80 No. 81	AB 33(1): 79 No. 89	AB 34(1): 67 No. 87	AB 35(1): 76 No. 109	AB 35(1): 76 No. 107	AB 37(1): 76 No. 83	D&S 1979 SS-P	D&S 1979 SS-PH	Average Non-Dolet Hills[3]	EH&A Dolet Hills
Eastern Bluebird	29	29							29	
Blue-gray Gnatcatcher									11	
White-eyed Vireo							42	160	59	62
Yellow-throated Vireo									+	
Red-eyed Vireo									23	
Black-and-white Warbler									13	
Swainson's Warbler									40	
Worm-eating Warbler					25				14	
Northern Parula									10	
Black-throated Green Warbler									+	
Chestnut-sided Warbler									30	
Prairie Warbler	116	116	88	88		214	42	50	84	139
Kentucky Warbler									37	
Common Yellowthroat							84	20	38	31
Yellow-breasted Chat	29	29	29	29			146	170	80	77
Hooded Warbler									63	
Orchard Oriole							20		20	
Common Grackle									0	5
Brown-headed Cowbird		29							13	12
Scarlet Tanager									+	
Northern Cardinal		29	29	29			52	80	38	15
Blue Grosbeak							62		62	
Indigo Bunting	88	116	88	88	98	198	42		86	92
Painted Bunting							42		42	

TABLE 2-6 (Concluded)

Species	AB 32(1): 80 No. 81	AB 33(1): 79 No. 89	AB 34(1): 67 No. 87	AB 35(1): 76 No. 109	AB 35(1): 76 No. 107	AB 37(1): 76 No. 83	D&S 1979 SS-P	D&S 1979 SS-PH	Average Non-Dolet Hills[3]	EH&A Dolet Hills
American Goldfinch		29							25	
Rufous-sided Towhee	290	348	348	466	272	164			222	
Chipping Sparrow			29	29		66			41	
Field Sparrow						50			50	6
Song Sparrow									10	
Total Density	610	930	726	814	420	692	626	720	676	648
Total No. Species	8	14	10	9	4	7	12	14	13	21
Size (ha)	6.9	6.9	6.9	6.9	8.1	6.1	10.0	10.0	14.0	25.0
Diversity (d)	1.65	2.89	2.01	1.86	0.81	1.46	3.00	3.50	2.69	3.89

[1] All densities are presented as birds per square kilometer.

[2] Abbreviations:

AB = American Birds (followed by volume (issue): page, census number)
D&S = Dickson and Segelquist (1979)
SS-P = Small sapling-pine
SS-PH = Small sapling-pine/hardwood
ha = hectares
d = Whittaker's Diversity Index (see Table 2-1)

[3] Averages presented are the average density of a species among those censuses on which it was encountered. The indicator "+" (signifying less than 0.5 territory on a given census plot) is averaged in as 0 birds per square kilometer. This method of calculation yields values slightly lower than the theoretical true means.

TABLE 2-7

SUMMARY: BOTTOMLAND FOREST BREEDING BIRD CENSUSES

Description	State	Size (hectares)	No. of Species	Birds/ sq. km.	Diversity (d)[1]	Source[2]
1. Mature Bottomland Hardwood Forest	LA	-	16	1,504	-	AB 27(6):974[3]
2. Tupelo Swamp	LA	10.0	26	3,080	5.20	AB 29(6):1097-98, No. 41
3. Floodplain Forest: Dredged Material Disposal Site	LA	7.6	20	2,518	4.10	AB 31(1):48, No. 51
4. Southern Floodplain Forest	TX	25.0	24	1,720	4.63	AB 28(6):1011, No. 48
5. Bottomland Hardwood Forest	TX	6.5	20	1,374	4.16	AB 33(1):67-68, No. 44
6. Mississippi Delta Bottomland Hardwoods (Managed)	AR	10.9	28	2,012	5.55	AB 37(1):67, No. 48
7. Mississippi Delta Bottomland Hardwoods (Unmanaged)	AR	9.7	29	2,244	5.81	AB 37(1):67, No. 49
Average		11.8	23	2,064	4.91	

[1] Whittaker's Diversity Index (see Table 2-1)

[2] AB = American Birds (followed by volume (issue): page, census number)

[3] From: Dickson (1978)

TABLE 2-8

BOTTOMLAND FOREST CENSUSES[1,2]

Species	AB[3] 27(6): 974 –	AB 29(6): 1097 No. 41	AB 31(1): 48 No. 51	AB 28(6): 1011 No. 48	AB 33(1): 67 No. 44	AB 37(1): 67 No. 48	AB 37(1): 67 No. 49	Average Non-Dolet Hills[4]	EH&A Dolet Hills
Green-backed Heron			26					26	
Yellow-crowned Night Heron		40						40	
Wood Duck		40				+	21	20	
Mississippi Kite			26				21	24	
Red-tailed Hawk						+		+	
Red-shouldered Hawk					+			+	
Broad-winged Hawk						18		18	
Wild Turkey						18		18	
Purple Gallinule		20						20	
Common Moorhen		+						+	
Yellow-billed Cuckoo	172	40	78	120	92	82	62	92	44
Barred Owl				+		18		9	
Chimney Swift		80						80	
Ruby-throated Hummingbird				32		92	124	83	
Northern Flicker					18			18	
Pileated Woodpecker	24			8		18	41	23	
Red-bellied Woodpecker	24	160	13	32	31	37	62	51	
Red-headed Woodpecker							21	21	
Hairy Woodpecker		+	+				21	7	
Downy Woodpecker		160		64	+	92	52	74	44
Eastern Kingbird		20						20	
Great Crested Flycatcher	12	380		56	15	28	41	89	
Acadian Flycatcher	124	280	52	448	92	146	154	185	131
Eastern Wood Pewee				8			21	15	
Blue Jay		60				56	21	46	

TABLE 2-8 (Cont'd)

Species	AB[3] 27(6): 974 -	AB 29(6): 1097 No. 41	AB 31(1): 48 No. 51	AB 28(6): 1011 No. 48	AB 33(1): 67 No. 44	AB 37(1): 67 No. 48	AB 37(1): 67 No. 49	Average Non-Dolet Hills[4]	EH&A Dolet Hills
American Crow					+			+	
Fish Crow								0	5
Carolina Chickadee		160		24	92	184	164	125	89
Tufted Titmouse	160	40		128	124	92	82	104	15
White-breasted Nuthatch				16				16	
Carolina Wren	296	160	78	128	124	120	102	144	44
Wood Thrush	12		104			+	41	39	9
Blue-gray Gnatcatcher				96		386	576	353	44
European Starling		80						80	
White-eyed Vireo	272		548	8	214	28	62	189	44
Yellow-throated Vireo	62			24	+			29	
Red-eyed Vireo	50	20	196	184	31	110	21	87	111
Black-and-white Warbler				8				8	
Prothonotary Warbler		400	274	128	31	92	52	163	111
Swainson's Warbler	50		13		+		21	21	
Northern Parula		220	108		124	74	144	134	44
Yellow-throated Warbler				24				24	
Kentucky Warbler	24						52	38	
Common Yellowthroat			26					26	
Yellow-breasted Chat			144				+	72	
Hooded Warbler	24		182				103	111	
American Redstart				8				8	
Red-winged Blackbird		180						180	
Orchard Oriole						28	21	25	
Northern Oriole		80						80	

TABLE 2-8 (Concluded)

Species	AB[3] 27(6): 974 -	AB 29(6): 1097 No. 41	AB 31(1): 48 No. 51	AB 28(6): 1011 No. 48	AB 33(1): 67 No. 44	AB 37(1): 67 No. 48	AB 37(1): 67 No. 49	Average Non-Dolet Hills[4]	Ell&A Dolet Hills
Common Grackle		140						140	
Brown-headed Cowbird		80	78	16	31	110	102	70	
Summer Tanager		40		24	62	18		36	
Northern Cardinal	186	160	366	160	148	102	102	175	89
Indigo Bunting			26			46	41	38	
Painted Bunting					62			62	
Rufous-sided Towhee	12		78					45	
Total Density	1,504	3,080	2,518	1,720	1,374	2,012	2,244	2,064	939
Total No. Species	16	26	20	24	20	28	29	23	15
Size (ha)	-	10	7.6	25	6.5	10.9	9.7	11.8	11.25
Diversity (d)	-	5.20	4.10	4.63	4.16	5.55	5.81	4.91	2.97

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[1] All densities are presented as birds per square kilometer.

[2] Abbreviations:

AB = American Birds (followed by volume(issue): page, census number)
d = Whittaker's Diversity Index (see Table 2-1)
ha = hectares

[3] From: Dickson (1978)

[4] Averages presented are the average density of a species among those censuses on which it was encountered. The indicator "+" (signifying less than 0.5 territory on a given census plot) is averaged in as 0 birds per square kilometer. This method of calculation yields values slightly lower than the theoretical true means.

(Dickson, 1978). The size of the Dolet Hills bottomland census plot was comparable to the other bottomland plots (11.25 ha versus an average 11.8 ha). Among 11 common, widespread bottomland bird species (found on 6 or 7 of 7 regional censuses), three species were not recorded on the Dolet Hills plot (Red-bellied Woodpecker, Great Crested Flycatcher, and Brown-headed Cowbird) and three others were markedly lower in density (differing by more than a factor of 3.0) (Tufted Titmouse, Carolina Wren, and White-eyed Vireo) (Table 2-2). Although this suggests that a diverse ecological array of species were absent or less numerous on the Dolet Hills plot, a conspicuous subset of them are cavity nesters (e.g. woodpeckers, parids, wrens). For example, a cavity-nesting flycatcher was absent (Great Crested Flycatcher) while an open-nesting species (Acadian Flycatcher) was the most numerous species on the transect. The average number of cavity-nesting species on the seven regional censuses was much greater than on the Dolet Hills plot (7.6 versus 5 species) (Table 2-9). This evidence points conspicuously to a lack of snags and/or standing dead timber in the Dolet Hills bottomland census plot. This situation is possibly the result of recent (5 to 20 years) timber management practices which have removed older hardwood trees ("high-grading") or other timber harvesting which eliminated standing dead wood or reduced the overall age of the stand (Allison, 1982). Although quantitative sampling of the vegetation was not made on the bird census plot, the plot most closely resembled Stand 25 (EH&A, 1980c): a water oak-sweetgum-hornbean forest approximately 24 m in height with a fairly well developed understory and dense ground cover. Timber management in the bottomlands varies in the Dolet Hills permit area. Only a few areas are relatively undisturbed (e.g., Stand 24; EH&A 1980c) while most have been selectively cut at one time or another (Allison, 1982). Because of this, the results of the previous comparison of bird population data may be taken to represent approximately average or typical conditions of most of the bottomland hardwoods in the project area.

TABLE 2-9

BOTTOMLAND FOREST CAVITY NESTING SPECIES

Census	Number of Cavity Nesting Species[1]
AB 27(6):974[2]	5
AB 29(6):1097, No. 41	9
AB 31(1):48, No. 51	4
AB 28(6):1011, No. 48	9
AB 33(1):67, No. 44	7
AB 37(1):67, No. 48	9
AB 37(1):67, No. 49	10
Average, regional censuses	7.6
EH&A Dolet Hills census	5

[1] Includes woodpeckers, Great Crested Flycatcher, parids, nuthatches, Carolina Wren, European Starling, and Prothonotary Warbler.

[2] From: Dickson (1978).

4.0 SUMMARY

In summary, examination of quantitative bird census data on the major habitats of the project area suggests the following generalizations about habitat quality on the site: (1) Relatively mature upland forests of the project area contain wildlife assemblages typical of the region, comparable in density and diversity to other similar areas; (2) Over much of the project area where timber management practices have created young to medium-aged upland forests, wildlife assemblages are also very typical of second growth habitats in the region; (3) Within the realm of stand-ages present on the Dolet Hills project area, bird densities and diversities are typically low in clear-cuts, and show an increase with stand age (Meyers and Johnson, 1978); (4) Bottomland hardwood forests in the project area apparently show significantly reduced densities and diversities of breeding birds. Evidence in the form of depressed numbers of cavity-nesting birds suggests that recent timber management practices which reduce the amount of standing dead timber may be one of the prominent factors limiting the avian populations.

5.0 ADDITIONAL REFERENCES

(See also Final SEIS, Sec. 8.0)

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APPENDICES TO THE HABITAT QUALITY ASSESSMENT

LIST OF CENSUSES

Census		Reference	Page
APPENDIX A			
Upland Forest:			
Mixed Pine-Hardwood Forest	(59)	AB 28(6): 1016; 1974	A-1
Mixed Pine-Hardwood Forest	(57)	AB 29(6): 1104; 1975	A-2
Mixed Pine-Hardwood Forest	(65)	AB 31(1): 53; 1977	A-3
Mixed Pine-Hardwood Forest	(58)	AB 32(1): 72; 1978	A-4
Mixed Pine-Hardwood Forest	(59)	AB 33(1): 71; 1979	A-5
Pole: Pine		Dickson & Segelquist, 1979	A-6
Pole: Pine-Hardwood		Dickson & Segelquist, 1979	A-6
Sawtimber: Pine		Dickson & Segelquist, 1979	A-6
Sawtimber: Pine-Hardwood		Dickson & Segelquist, 1979	A-6
Loblolly Pine Forest	(68)	AB 28(6): 1020-21; 1974	A-7
Mixed Pine-Deciduous Forest	(71)	AB 36(1): 70; 1982	A-9
APPENDIX B			
Clear-cut:			
Deciduous Clear-cut	(90)	AB 29(6): 1117-18; 1975	B-1
Deciduous Clear-cut	(85)	AB 31(1): 62; 1977	B-3
Deciduous Clear-cut	(79)	AB 32(1): 80; 1978	B-4
Deciduous Clear-cut	(85)	AB 33(1): 78; 1979	B-5
Deciduous Clear-cut	(83)	AB 34(1): 66; 1980	B-6
Deciduous Clear-cut	(106)	AB 35(1): 76; 1981	B-7
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* Taken from Dickson, 1978.

APPENDIX A OF THE HABITAT QUALITY ASSESSMENT
UPLAND FOREST CENSUSES

From: AB 28(6):1016;1974

59. MIXED PINE–HARDWOOD FOREST. — Location: Texas; Angelina Co., Angelina College property, 1.6 miles S of intersection of Loop 287 and U.S. 59; 31°17′34″N, 94°44′1″W, Lufkin Quadrangle, USGS. **Continuity:** New. **Size:** 6.32 ha = 15.6 acres (irregular, 862.5 ft x 787.5 ft, laid out with compass, steel tape and level). **Description of Plot:** The dominant canopy trees are Loblolly Pine (*Pinus taeda*), Water Oak (*Quercus nigra*), and S. Red Oak (*Q. falcata*). Most prominent in the understory are Virginia Creeper (*Parthenocissus quinquefolia*), green-brier (*Smilax* spp), Sugar Maple (*Acer saccharum*), Winged Elm (*Ulmus alata*) and saplings of the canopy trees. The ground cover is primarily Poison Ivy (*Rhus radicans*), Long-leaf Uniola (*Uniola sessiliflora*), and sedges (*Carex* spp). A quantitative survey of the vegetation shows: Trees 3 inches in diameter and over, based on six 0.1 acre circular samples, 354/acre; total basal area 63.5 ft^2/acre. Species comprising 90% of the total number of trees (figures after each give number of trees/acre, relative density (%), relative dominance, frequency, in that sequence): Loblolly Pine, 96, 27, 52, 100; Water Oak, 70, 20, 8, 83; dead trees, 46, 13, 6, 100; S. Red Oak, 30, 9, 9, 67; Am. Hornbeam (*Carpinus caroliniana*), 18, 5, 2, 33; Hackberry (*Celtis occidentalis*), 14, 4, 3, 83; Am. Hophornbeam (*Ostrya virginiana*), 11, 3, 1, 50; Winged Elm, 8, 2, 1, 50; White Ash (*Fraxinus americana*), 8, 2, 1, 17; Am. Elm (*Ulmus americana*), 8, 2, 1, 50. Trees by diameter size class (figures after each class give numbers of trees/acre, relative density (%), basal area in square feet/acre, relative dominance): A (3-6 in.) 235, 66, 23.5, 23.1; B (6-9 in.) 66, 18, 19.8, 19.4; C (9-15 in.) 42, 12, 33.6, 32.8; D (15-21 in.) 11, 3, 19.8, 19.8; E (21-27 in.) 2, 0, 6.2, 4.9. Shrub stems/acre 2051.7; ground cover 40%; canopy cover 90%; average canopy height 62.7 feet (range 44-73 ft). **Edge:** Bordered on all sides by similar forest. **Topography:** Part is on a north-facing slope (1-8%), rest is essentially flat. **Elevation:** 240 ft. **Weather:** Most census dates had clear to partly cloudy skies. Temperatures ranged from 42° to 75°F. Rainfall during the census months was about normal. **Coverage:** March 29; April 5, 13, 19, 21, 26; May 5, 10, 17, 20, 24; June 3, 15. All trips between 0700 and 0800 hours. Total man-hours: 13 censusing and 20 surveying and laying out the grid. **Census:** Cardinal, 10 (158, 64); White-eyed Vireo, 7 (111, 45); Carolina Wren, 4 (63, 26); Kentucky Warbler, 3 (48, 19); Tufted Titmouse, 2; Hooded Warbler, 2; Yellow-billed Cuckoo, 1; Downy Woodpecker, 1; Carolina Chickadee, 1; Swainson's Warbler, 1; N. Parula, 1; Summer Tanager, 1. **Total:** 12 species; 34 territorial males or females (539/km^2, 218 per 100 acres). **Remarks:** Mammals seen were White-tailed Deer, Fox Squirrel, and Wood Rabbit. Reptiles seen and collected were a Speckled Kingsnake and a Texas Rat Snake. Setting up the grid and conducting a quantitative habitat description was a field project of the Environmental Biology Class. Special thanks to M. F. Wickman and R. C. Burleson of the Soil Conservation Agency for their assistance in laying out the grid and with the identification of plants. — CARROLL MOORE, JOHN FINLEY, LOUIS DEBETAZ (compiler), *Science Division, Angelina College, Lufkin, Tex. 75901.*

60. BURNED JACK PINE RIDGE. — Location: Minnesota; St. Louis Co., 22 miles E of Buyck and 2.5 miles N of Echo Trail in 1971 Little Sioux forest fire area; 48°10′30″N, 92°10′30″W, Shell Lake Quadrangle, USGS. **Continuity:** New. **Size:** 13.5 ha = 33.36 acres (rectangular, 300 x 450 m; 50 x 50 m individual plots, measured by compass and calibrated wire). **Description of Plot:** The dominant canopy trees are composed almost entirely of dead, charred Jack Pine (*Pinus banksiana*) snags. Most prominent in the understory are Quaking Aspen (*Populus tremuloides*), Bush Honeysuckle (*Diervilla lonicera*), Sweet Fern (*Comptonia peregrina*), Beaked Hazel (*Corylus cornuta*), and Jack Pine. The ground cover is mainly blueberry (*Vaccinium* sp.), Wintergreen (*Gaultheria procumbens*), Bunchberry (*Cornus canadensis*), Yellow Clintonia (*Clintonia borealis*), and Large-leaf N. Aster (*Aster macrophyllus*). Approximately one-fourth of the plot is typified by large, open granite surfaces. A quantitative survey of the vegetation gave the following results: Trees 3 inches in diameter and over, based on five circular samples, 264/acre; total basal area 61.4 ft^2/acre. Species comprising 90% of the total number of trees: Burned Jack Pine, 194, 73, 80, 100; burned fir, 28, 11, 7, 60; burned White Pine (*P. strobus*), 20, 8, 5, 40. Trees by diameter size class: A (3-6 in.) 94, 36, 9.4, 15; B (6-9 in.) 124, 47, 37, 61; C (9-15 in.) 46, 17, 15, 24. Shrub stems per acre 4,400; ground cover 72%; canopy cover 13%; average canopy height 45 ft (range 30-54). **Edge:** Bordered on all sides by similar forest with the western edge within 50 ft of unburned Jack Pine. **Topography:** Situated on a ridge with a gentle upward slope from the south, southwest, and west to the highest point in the northeast corner. **Elevation:** 1380 - 1489 ft. **Weather:** Generally quite cool with temperatures ranging from 38° to 60°F. Wind never exceeded force 3 and cloud cover varied from clear to heavy overcast. No precipitation occurred during censusing. **Coverage:** June 14-21. All trips between 0510 and 0845 hours. Total man-hours: 13.5. **Census:** Chestnut-sided Warbler, 14 (104, 42); Mourning Warbler, 9 (67, 27); White-throated Sparrow, 9; Chipping Sparrow, 2; Com. Nighthawk, 1; Com. Flicker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; Black-backed Three-toed Woodpecker, 1; Least Flycatcher, 1; Blue Jay, 1; Brown Thrasher, 1; Am. Robin, 1; Hermit Thrush, 1; Cedar Waxwing, 1; Red-eyed Vireo, 1; Indigo Bunting, 1; Dark-eyed Junco, 1. **Total:** 18 species; 48 territorial males or females (356/km^2, 144 per 100 acres). **Remarks:** Nests located: Com. Nighthawk, 1; Black-backed Three-toed Woodpecker, 1; Brown Thrasher, 1. One Pine Marten was sighted, and there were good signs of Moose and White-tailed Deer. The research area is in the May 1971 Little Sioux forest fire area of the Boundary Waters Canoe Area, composed of mature, virgin Jack Pine which has never been logged and was revegetated from the last fire in 1864. Special thanks to my wife, Bonnie, for assistance in measuring the plot. — GERALD J. NIEMI, *227 W. 4th St., Duluth, Minn. 55806.*

61. MATURE JACK PINE FOREST. — Location: Minnesota; St. Louis Co., 19 miles E of Buyck and 0.5 mile N of Echo Trail: 48°08′N, 92°16′W. Lake Jeanette, Minn.-Ont. Quadrangle, USGS. **Continuity:** New. **Size:**

From: AB 29(6):1104;1975

m; sectioned into lots for development as part of the city of Long Beach). **Description of Plot**: See *AB* 27: 978-979, 1973 and 28: 1015, 1974. **Weather**: Cool, wet, with strong winds. **Coverage**: April 24, 28; May 2, 12, 16, 22, 26, 30; June 5, 19; July 1; between 0543 and 1032, EST. Total man-hours: 61.6. **Census**: Great Crested Flycatcher, 8.5 (44, 18); Cardinal, 8 (42, 17); Red-bellied Woodpecker, 5 (26, 11); Tufted Titmouse, 5; Carolina Wren, 5; Blue Jay, 4 (21, 8); Bobwhite, 3 (16, 6); Painted Bunting, 3; Rufous-sided Towhee, 2.5 (12, 5); Mourning Dove, 2; Yellow-billed Cuckoo, 2; Com. Flicker, 2; Red-headed Woodpecker, 2; Downy Woodpecker, 2; Carolina Chickadee, 2; Mockingbird, 2; Brown Thrasher, 2; Summer Tanager, 2; Ground Dove, 1; Pileated Woodpecker, 1; Blue-gray Gnatcatcher, 1; Pine Warbler, 1; Prairie Warbler, 1; Orchard Oriole, 1; Chuck-will's-widow, 0.5. **Total**: 25 species; 68.5 territorial males or females (356/km^2, 144/100 acres). **Remarks**: Great Crested Flycatchers and Cardinals were again our most abundant breeding species; towhees increased significantly, while nesting vireos disappeared. Hairy Woodpeckers were observed in the area with young. There were three new summer cottages, making a total of 15. — SAMUEL R. and ISABEL H. TIPTON, *113 W. 23rd St., Long Beach, Southport, N. C. 28461.*

57. MIXED PINE—HARDWOOD FOREST — Location: Texas; Angelina Co., Angelina College Property, 1.6 miles S of intersection of Loop 287 and U.S. 59; 31°17'34''N, 94°44'1''W, Lufkin Quadrangle, USGS. **Continuity**: Established 1974. **Size**: 6.32 ha = 15.6 acres (irregular, 862.5 x 787.5 ft, laid out with compass, steel tape, and level). **Description of Plot**: See *AB* 28: 1016, 1974. **Weather**: Five of the 11 dates had overcast skies but no precipitation; the remaining had clear to partly cloudy skies. Rainfall during the first six months was slightly below normal. Temperatures ranged from 35° to 78°F. **Coverage**: March 15, 21; April 3, 11, 19; May 2, 11, 16, 26; June 6, 13; between 0700-0930 hours with an average of 60 minutes per trip. Total man-hours: 10. **Census**: Cardinal, 10 (158, 64); White-eyed Vireo, 7 (111, 45); Carolina Wren, 4 (63, 26); Blue Jay, 3, (48, 19); Carolina Chickadee, 3; Tufted Titmouse, 3; Swainson's Warbler, 2; Hooded Warbler, 2; Red-eyed Vireo, 1; Kentucky Warbler, 1; Brown-headed Cowbird, +. **Total**: 11 species; 35 territorial males or females (554/km^2, 224/100 acres). **Remarks**: No nests were located but Cardinal and White-eyed Vireo fledglings were seen on two different occasions. Three new species added to the list of probable nesters were Blue Jay, Red-eyed Vireo, and Brown-headed Cowbird. Absent from last year's group were Yellow-billed Cuckoo, Downy Woodpecker, N. Parula and Summer Tanager. — CARROLL MOORE and LOUIS DEBETAZ (compiler), *Science Division, Angelina College, Lufkin, Tex. 75901.*

58. TAMARACK—WHITE CEDAR SLOUGH. — Location: Ontario; Norfolk Co., Port Rowan, 2 miles W of Long Point Lighthouse; 42°33'N, 80°05'W, Dept. of Energy, Mines and Resources, Ottawa. **Continuity**: Established 1973; 3 consecutive years. **Size**: 6.07 ha = 15 acres (rectangular, laid out in 0.5 acre squares with compass and measured rope, roughly 750 x 100 yds.). **Description of Plot**: See *AB* 28: 1017-1018, 1974. **Edge**: The W and N edges border on similar habitat. The S edge borders on fairly open sand dunes and the E edge on a large pond with open water. **Topography**: Flooded forested ridges with open standing water between; the result of several years of high water levels. **Elevation**: 575 ft. **Weather**: Generally sunny and warm with light winds. **Coverage**: May 31; June 4, 7, 10, 13, 16, 21, 24, 27; July 1, 5; between 0545 and 1300, EST. Total man-hours: 62. **Census**: Red-winged Blackbird, 8 (132, 53); Com. Grackle, 6 (99, 40); N. Oriole, 5.5 (91, 37); House Wren, 4.5 (74, 30); E. Kingbird, 4 (66, 27); Yellow Warbler, 4; Black-capped Chickadee, 3 (49, 20); Chipping Sparrow, 3; Song Sparrow, 3; E. Wood Pewee, 2; Tree Swallow, 2; Cardinal, 2; Gray Catbird, 1.5; Mallard, 1; Am. Woodcock, 1; Yellow-billed Cuckoo, 1; Great Crested Flycatcher, 1; Am. Robin, 1; Starling, 1; Am. Redstart, 1; Brown-headed Cowbird, 1; Com. Yellowthroat, 0.5; Blue Jay, +; Brown Thrasher, +. **Total**: 24 species; 57 territorial males (939/km^2, 380/100 acres). **Remarks**: Nests located (26): Red-winged Blackbird, 8; E. Kingbird, 4; N. Oriole, 4; E. Wood Pewee, 2; Tree Swallow, 2; Am. Robin, 1; Starling, 1; Yellow Warbler, 1; Com. Grackle, 1; Chipping Sparrow, 1; Song Sparrow, 1. There was a substantial density increase over last year; from 642/km^2, 260/100 acres to 939/km^2, 380/100 acres. Special thanks to Gary Miller for his direction and to Pamela Roy and Tim Terrio for their assistance. — JON D. McCRACKEN, *Long Point Bird Observatory, Port Rowan, Ont. NOE 1M0. Canada.*

59. WHITE PINE—WHITE CEDAR FOREST. — Location: Ontario, Norfolk Co., Port Rowan, 3.5 miles W of Long Point Lighthouse; 42°32'56''N, 80°6'01''W, Gravelly Bay, Dept. of Energy, Mines and Resources, Ottawa. **Continuity**: Established 1973; 3 consecutive years. **Size**: 4 ha = 10 acres (laid out in 0.5 acre squares with compass and measured rope). **Description of Plot**: See *AB* 28: 1018-1019, 1974. **Weather**: Generally sunny and warm with a light breeze. **Coverage**: June 1, 4, 8, 11, 14, 17, 22, 25, 29; July 2; between 0600 and 1100, EST. Total man-hours: 38. **Census**: House Wren, 5 (124, 50); Black-capped Chickadee, 3 (74, 30); Rufous-sided Towhee, 2; Chipping Sparrow, 2; Field Sparrow, 2; Mallard, 1; E. Kingbird, 1; Blue Jay, 1; Gray Catbird, 1; Magnolia Warbler, 1; Red-winged Blackbird, 1; Cardinal, 1; Great Crested Flycatcher, 0.5; E. Wood Pewee, 0.5; Indigo Bunting, 0.5; Hairy Woodpecker, +; Com. Grackle, +. **Total**: 17 species; 22.5 territorial males (556/km^2, 225/100 acres). **Remarks**: Nests located (5): Hairy Woodpecker, 1; House Wren, 1; Cardinal, 1; Field Sparrow, 2. A family of Mallards was also seen on several occasions. Special thanks to Gary Miller for his direction and to Pamela Roy and Tim Terrio for their assistance. — JON D. McCRACKEN, *Long Point Bird Observatory, Port Rowan, Ont. N0E 1M0. Canada.*

60. SCOTCH PINE PLANTATION. — Location: New York; Chautauqua Co.; 0.72 mile SE of Route 5 and Van Buren Road intersection on Fredonia Airport

From: AB 31(1):53;1977

Flycatchers are again the most abundant breeding species. Total of all species is back to the 1974 level. Cardinals, Great Crested Flycatchers, titmice, Bobwhites, Downy Woodpeckers and gnatcatchers (one feeding a cowbird), were seen with young. Seventeen cottages (2 more than in 1975) and 2 being built are on the area. — *SAMUEL R.* and *ISABEL H. TIPTON, 113 23rd St., S.W., Long Beach, Southport, N.C. 28461.*

64. TAMARACK BOG AND HARDWOOD. — Location: Michigan; Berrien Co., one mi. SW of Stevensville in the Grand Mere State Park, 0.5 mi. N of Willow Drive on Wishart Road; 41°59'30"N, 86°33'W, Bridgman Quadrangle, USGS. **Continuity:** New. **Size:** 8.5 ha = 21 acres (rectangular). **Description of Plot:** See *AB* 30:1049 (1976). **Coverage:** May 23, 27, 30; June 1, 6, 12-13, 16, 20; between 0600 and 0900. Total man-hours: 13.5. **Weather:** Clear on all trips with fog one morning; temp. and rainfall normal. **Census:** Blue Jay, 3 (35, 14); Veery, 3; Canada Warbler, 3; Great Crested Flycatcher, 2; Cardinal, 2; E. Wood Pewee, 1; Tufted Titmouse, 1; Gray Catbird, 1; Wood Thrush, 1; Com. Yellowthroat, 1; Scarlet Tanager, 1; White-breasted Nuthatch, 0.5; Ovenbird, 0.5; Downy Woodpecker, +; Red-breasted Nuthatch, +; Red-eyed Vireo, +. **Total:** 16 species; 20 territorial males (235/km^2, 95/100 acres). **Remarks:** Nests located: Wood Thrush, Scarlet Tanager. — *ALBERT MORSE, JAMES MULLINS* (compiler), *2558 Locust Lane, Stevensville, Mich. 49127.*

65. MIXED PINE-HARDWOOD FOREST. — Location: Texas; Angelina Co., Angelina College Property, 1.6 mi. S of intersection of Loop 287 and US 59; 31°17'34"N, 94°44'1"W, Lufkin Quadrangle, USGS. **Continuity:** Established 1974; 3 consecutive years. **Size:** 6.31 ha = 15.6 acres (irregular, 862.5 x 787.5 ft, laid out with compass, steel tape, and level). **Description of Plot:** See *AB* 28: 1016 (1974). **Weather:** Three days had overcast skies but no precipitaiton; the remaining were clear to partly cloudy. Precipitation above normal, temperatures ranged from 48° to 66°F. **Coverage:** March 31; April 5, 14, 19, 28; May 3, 14, 19, 27-28; between 0700-1000 hours. Total man-hours: 10. **Census:** White-eyed Vireo, 9 (143, 58); Cardinal, 9; Carolina Wren, 6 (95, 38); Hooded Warbler, 3 (48, 19); Red-eyed Vireo, 2; Swainson's Warbler, 2; Kentucky Warbler, 2; Brown-headed Cowbird, 2; Green Heron, 1; Blue Jay, 1; Tufted Titmouse, 1; Carolina Chickadee, 1; Summer Tanager, 1. **Total:** 13 species; 40 territorial males or females (634/km^2, 256/100 acres). **Remarks:** Nests located: White-eyed Vireo; a cowbird egg was found with four vireo eggs. Population density increased from 554/km^2, 224/100 acres in 1975 to 634/km^2, 256/100 acres. — *CATHI TURNEY* and *LOUIS DEBETAZ* (compiler), *Science Division, Angelina College, Lufkin, Texas 75901.*

66. CONIFEROUS FOREST. — Location: Vermont; Lamoille Co., 3.5 mi. N of Wolcott; 44°36'N, 72°26'W, Hardwick Quadrangle, USGS. **Continuity:** New. **Size:** 13.15 ha = 32.5 acres (surveyed by tape and compass and divided into 49 sub-plots; boundaries marked with aluminum plates painted with letters and numbers). **Description of Plot:** Situated on the low lying peatlands and adjacent north-facing slope drained by Tamarack Brook. In the better-drained upper slope sections the overstory consists of mixed conifers and hardwoods dominated by Balsam Fir (*Abies balsamea*). Red Spruce (*Picea rubens*) is less important here than in the lower portions, and hardwoods, represented mostly by White Birch (*Betula papyrifera*) and Red Maple (*Acer rubrum*), are common, with Black Cherry (*Prunus serotina*) and Yellow Birch (*B. alleghaniensis*) occasionally present. The stand is of mixed ages. The herbaceous understory here is dominated by Wood Sorrel (*Oxalis montana*), Bunchberry (*Cornus canadensis*), and Goldthread (*Coptis groenlandicum*). Balsam Fir reproduction is excellent in some places and in the wetter down-slope section it remains dominant, but Red Spruce becomes more prominent and the hardwoods less so. Only occasionally do White Birch and Red Maple persist into the peat soils of the wet bottomland. Toward the lower areas, woody shrubs become more important in the understory, with Lowbush Blueberry (*Vaccinium angustifolium*), Wild Raisin (*Viburnum cassinoides*) and Mountain Holly (*Nemopanthus mucronata*) becoming common. There are occasional logged over areas with no overstory, but Balsam Fir and Red Spruce seedlings, 2 to 3 m in height are abundant. Progressing toward the wetter soils, Black Spruce (*Picea mariana*) and Tamarack (*Larix laricina*) begin to appear, becoming common near the brook. The peat substrate supports a more bog-like understory consisting, in some places, of a sphagnum ground cover with Creeping Snowberry (*Gaultheria hispidula*). Pitcher plants (*Saracenia purpurea*) are scattered and Labrador-tea (*Ledum groenlandicum*) is abundant in places. At the border of the brook, a community dominated by Speckled Alder (*Alnus rugosa*) and sedges (*Carex* spp.) replaces the coniferous forest vegetation. **Edge:** The N border is Tamarack Brook, with its associated alder-sedge community, beyond which the bottomland Black Spruce-Tamarack forest continues. The S border is a continuation of the mixed conifer-hardwood forest. Along the E and W edges are mixed conifer-hardwoods on the upper slopes, and a Red Spruce-Balsam Fir community in the wetter downslope areas. **Topography:** S edge (at 1250 ft) slopes gently toward the N border (1100 ft). **Weather:** Temperatures ranged from 29° to 70°F. **Coverage:** May 17, 21, 24-25, 28; June 2-3, 5, 7-8, 10, 12, 14, 17, 20, 22 25; 0500-0900 hours, EDT. Total: 57 man-hours. **Census:** Magnolia Warbler, 10 (76, 31); Yellow-rumped Warbler, 8 (61, 25); Cape May Warbler, 7 (53, 22); Ruby-crowned Kinglet, 7; N. Parula, 6 (46, 18); Golden-crowned Kinglet, 5 (38, 15); Blackpoll Warbler, 4 (30, 12); N. Waterthrush, 4; Brown-headed Cowbird, 4; White-throated Sparrow, 4; Red-breasted Nuthatch, 3 (23, 9); Black-throated Green Warbler, 3; Purple Finch, 2.5; Winter Wren, 2; Nashville Warbler, 2; Bay-breasted Warbler, 2; Ovenbird, 2; Ruffed Grouse, 1; Yellow-bellied Sapsucker, 1; Yellow-bellied Flycatcher, 1; Veery, 1; Solitary Vireo, 1; Black-and-white Warbler, 1; Com. Yellowthroat, 1; Canada Warbler, 1. **Total:** 25 species; 79.5 territorial males (604/km^2, 245/100 acres). **Visitors** (average number per 100 acres): Blue Jay, 3; Pine Siskin, 3; Com. Raven, 2; Am. Robin, 2; Broad-winged Hawk, 1; Am. Goldfinch, 1. **Remarks:** Nests found: Yellow-bellied Flycatcher, 1; Red-breasted Nuthatch, 1; Winter Wren, 1; N. Parula, 1; Yellow-rumped Warbler, 1; N. Water-

From: AB 32(1):72;1978

21 acres. **Description of Plot:** See *AB* 30:1049 (1976). **Weather:** May was hot and dry; June, cool and dry. **Coverage:** May 28-29; June 7-12; 0630-0900. Total man-hours: 9. **Census:** Veery, 3 (35, 14); Cardinal, 2.5; Great Crested Flycatcher, 2; Red-eyed Vireo, 2; Canada Warbler, 2; Red-headed Woodpecker, 1; E. Wood Pewee, 1; Blue Jay, 1; Tufted Titmouse, 1; White-breasted Nuthatch, 1; Gray Catbird, 1; Am. Robin, 1; Downy Woodpecker, 0.5; Black-capped Chickadee, 0.5; Scarlet Tanager, 0.5; Mourning Dove, +; Com. Flicker, +; Cedar Waxwing, +. **Total:** 18 species; 20 territorial males (235/km^2, 95/100 acres). **Remarks:** Gained four new species; lost two. — *ALBERT MORSE, JAMES MULLINS (compiler), 2558 Locust Lane, Stevensville, Mich. 49127.*

58. MIXED PINE-HARDWOOD FOREST. — Location: Texas; Angelina Co., Angelina College Property, 1.6 mi S of intersection of Loop 287 and US 59; 31°17′34″N, 94°44′1″W, Lufkin Quadrangle, USGS. **Continuity:** Established 1974; 4 consecutive years. **Size:** 6.32 ha = 15.6 acres. **Description of Plot:** See *AB* 28:1016 (1974). **Weather:** Clear to partly cloudy skies; precipitation was negligible. Temperatures 67-73°F. **Coverage:** May 16-20, 24-26; 0800-0900, with an average of 60 minutes per trip. Total man-hours: 8. **Census:** Cardinal, 8 (127, 51); White-eyed Vireo, 5 (79, 32); Red-eyed Vireo, 3 (48, 19); Acadian Flycatcher, 2; Carolina Chickadee, 2; Tufted Titmouse, 2; Swainson's Warbler, 2; Hooded Warbler, 2; Green Heron, 1; Yellow-billed Cuckoo, 1; Carolina Wren, 1; Kentucky Warbler, 1; Brown-headed Cowbird, +. **Total:** 13 species; 30 territorial males or females (475/km^2, 192/100 acres). **Remarks:** No nests were found. Population density was at a four-year low. — *LOUIS DEBETAZ (compiler), Science Division, Angelina College, Lufkin, Tex. 75901.*

59. UPLAND SCOTCH PINE PLANTATION. — Location: New York; Allegany Co., 2 mi WSW of Alfred, bordering on the W side of Lake Road, adjacent to the evergreen plantings on the E side of Foster Lake; 42°7′30″N, 77°45′W, Andover Quadrangle, USGS. **Continuity:** Established 1969; 9 consecutive years. **Size:** Approximately 9.3 ha = 23 acres. **Description of Plot:** See *AFN* 23:743-744 (1969). No Christmas trees were harvested this year. Selective cutting of second-growth pine increased the open spaces in the large sections of the plantation where the pines are much too tall for use as Christmas trees. **Weather:** Alfred Cooperative Weather Station data indicates that precipitation during May, June and July was near normal. Average mean daily temperatures during June and July were within normal range but May was a full 10°F warmer than the 57-year average. **Coverage:** April 10; May 6, 14, 24, 30-31; June 4, 10, 16, 21; July 11, 15, 22, 29; August 3; 0845-1530, EDT, plus one trip at dusk. Total man-hours: 22. **Census:** Song Sparrow, 25 (269, 109); Chipping Sparrow, 20 (215, 87); Com. Yellowthroat, 9 (97, 39); Field Sparrow, 9; Rufous-sided Towhee, 5 (54, 22); Am. Robin, 4 (43, 17); Purple Finch, 4; Am. Woodcock, 3 (32, 13); Nashville Warbler, 3; Cedar Waxwing, 2; Magnolia Warbler, 2; Yellow-rumped Warbler, 2; Brown-headed Cowbird (females), 2; Black-billed Cuckoo, 1; Alder Flycatcher, 1; Tree Swallow, 1; Gray Catbird, 1; Brown Thrasher, 1; Prairie Warbler, 1; Indigo Bunting, 1; E. Kingbird, +; Bobolink, +; Red-winged Blackbird, +. **Total:** 23 species; 97 territorial males (1042/km^2, 422/100 acres). **Remarks:** Nests found: Chipping Sparrow, 8; Song Sparrow, 6; Am. Robin, 3; Field Sparrow, 3; Purple Finch, 2; Tree Sparrow, 1; Prairie Warbler, 1; Com. Yellowthroat, 1. Two Song Sparrow nests were parasitized by cowbirds. Nashville Warbler and Indigo Bunting were new breeding species this year. Appreciation is extended to Eddy Foster for permission to conduct the study; to Clarence Klingensmith for assistance; and to Gaylord Rough for weather data. — *ELIZABETH W. BROOKS, Water Wells Rd., Alfred Station, N.Y. 14803.*

60. YOUNG SPRUCE FOREST. — Location: Maine, Hancock Co., Deer Isle; 0.35 mi N of Stinson Point, 44°10′N, 68°43′W, Deer Isle Quadrangle, USGS. **Continuity:** New. **Size:** 5.06 ha = 12.5 acres (from survey map). **Description of Plot:** Area was cut and partially burned prior to 1958. The rejuvenating forest provides a patchy habitat with dense stands of conifers interspersed with open areas of hardwoods, shrubs, and herbaceous ground cover. Scattered White Birch and spruce snags 6-14 m high provide perches for singing and feeding. There are a few granite outcroppings; a small gravel road and old woods roads cross the W and S parts of the plot. Dominant canopy trees are Red Spruce (*Picea rubens*), White Spruce (*P. glauca*), Balsam fir (*Abies balsamea*), White Birch (*Betula papyrifera*), Yellow Birch (*B. lutea*), and Red Maple (*Acer rubrum*). The largest conifers are 4-5 m in height and 5-10 cm dbh; the largest hardwoods are 10 m high and 15 cm dbh. Most prevalent shrubs are Pin Cherry (*Prunus pensylvanica*), Blackberry (*Rubus* sp.), Raspberry (*Rubus strigosus*) and Meadowsweet (*Spiraea* spp.). Ground cover consists of boreal forbs such as Bunchberry (*Cornus canadensis*) and Cranberry (*Vaccinium macrocarpon*). Grasses, ferns — predominantly Hayscented (*Dennstaedtia punctilobula*), mosses (*Polytrichum* spp. and *Sphagnum* spp.) and lichens (*Cladonia* spp.). **Edge:** Bordered on all sides by patches of similar habitat and mature forest. Bold rocky shore of Penobscot Bay lies 300 ft W of plot. **Topography:** Slopes NW. **Elevation:** 20-120 ft. **Weather:** June very wet; July dry. Temperature range 54-80°F. Winds up to 25 mph. **Coverage:** June 20-24, 28-30; July 1-8; 0430-2000 hours, usually 0630-1030. Total man-hours: 20. **Census:** Magnolia Warbler, 7 (56, 23); Am. Redstart, 6 (48, 19); Black-throated Green Warbler, 4 (32, 13); White-throated Sparrow, 4; Black-and-white Warbler, 2.5; Swainson's Thrush, 2; Am. Goldfinch, 2; Dark-eyed Junco, 2; Winter Wren, 1.5; Cedar Waxwing, 1.5; Com. Yellowthroat, 1.5; Mourning Dove, 1; Ruby-throated Hummingbird, 1; Com. Flicker, 1; Olive-sided Flycatcher, 1; Red-breasted Nuthatch, 1; Gray Catbird, 1; Am. Robin, 1; Nashville Warbler, 1; Purple Finch, 1; Downy Woodpecker, 0.5; E. Wood Pewee, +; Starling, +. **Total:** 23 species; 43.5 territorial males (860/km^2, 348/100 acres). **Visitors:** Com. Crow, Com. Raven, Yellow-rumped Warbler. **Remarks:** Cedar Waxwing unusually abundant. Species observed after census period as visitors or transients included Tree Swallow, Barn Swallow, Hermit Thrush, Song Sparrow. — *KENNETH L. and THOMAS L. CROWELL, Sunset, Me. 04683.*

61. MIXED FOREST, OLD FIELD AND HOMESITE. — Location: Vermont; Windsor Co., 1.5 mi S of Woodstock on Church Hill; 43°36′N, 72°31′W, Woodstock Quadrangle, USGS. **Continuity:** Established 1973;

From: AB 33(1):71;1979

years. **Size:** Until 1961, 80 acres; since 1961, 26.3 ha = 65 acres. **Description of Plot:** See *AFN* 2:153-154 (1948). **Weather:** In general, clear and warm, average temperature 72°F. **Coverage:** Apr. 2, 30; May 7, 24; June 1, 9, 15, 20, 25, 27; July 7. Total 13 trips, 9 at 0600-1115 hours; one at 1055-1500; 3 at 1300-1900, EST. Total man-hours: 33. **Census:** Red-eyed Vireo, 9 (34, 14); Red-bellied Woodpecker, 5 (19, 8); Tufted Titmouse, 4 (15, 6); Wood Thrush, 4; Ovenbird, 4; Carolina Chickadee, 3.5 (13, 5); Cardinal, 3.5; Downy Woodpecker, 3 (11, 5); Blue Jay, 3; Scarlet Tanager, 3; Hairy Woodpecker, 2; White-breasted Nuthatch, 2; Com. Flicker, 1; Pileated Woodpecker, 1; Com. Crow, 1; Veery, 1; E. Wood Pewee, 0.5. **Total:** 17 species; 50.5 territorial males (192/km², 78/100 acres). **Remarks:** Nests found: Red-bellied Woodpecker, Carolina Chickadee, Tufted Titmouse, 1 each. The total of 17 species is lower than last year's 21 and the total of 50.5 territorial is much lower than last year's 77. In 1948, the first year of the census, there were 29 species and 235 pairs per 100 acres. These figures reflect the rapid loss of summer residents that has been going on in the Washington area, chiefly involving vireos, warblers, flycatchers, and thrushes. Factors which are being studied as possible causes are loss of nearby similar habitat and greater human use as well as deforestation and pollution of these migrant's wintering grounds. The preceding two severe winters probably resulted in the complete absence of Carolina Wrens in 1977 and 1978. There had been 8 pairs in 1973 and 6.5 in 1974 (no census in 1975-76). — *JOAN H. CRISWELL (compiler), RICHARD VINE, ROBERT FORD, MERWIN TERRY, Audubon Naturalist Society, 8940 Jones Mill Road, Washington, D.C. 20015.*

56. TAMARACK BOG AND HARDWOOD. — Location: Michigan; Berrien Co., 1 mi SW of Stevensville, in Grand Mere State Park, 0.05 mi N of Willow Drive on Wishart Road; 41°59'30"W, 86°33'W, Bridgman Quadrangle. **Continuity:** Established 1976; 3 consecutive years. **Size:** 8.5 ha = 21 acres. **Description of Plot:** See *AB* 30:1049 (1976). **Weather:** Normal. **Coverage:** June 4, 11, 18, 25; July 2, 4, 9, 16; 0700-1000 hrs. Total man-hours: 8. **Census:** Veery, 3 (35, 14); Great Crested Flycatcher, 2; Blue Jay, 2; Wood Thrush, 2; Canada Warbler, 2; Mourning Dove, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; E. Wood Pewee, 1; White-breasted Nuthatch, 1; Gray Catbird, 1; Am. Robin, 1; Red-eyed Vireo, 1; Ovenbird, 1; Scarlet Tanager, 1; Cardinal, 1; Tufted Titmouse, 0.5; Black-billed Cuckoo, +; Com. Flicker, +; Black-capped Chickadee, +. **Total:** 20 species; 22.5 territorial males (265/km², 107/100 acres). **Remarks:** Nests found: robin, Wood Thrush. Population density was at a three-year height. — *ALBERT MORSE, JAMES MULLINS (compiler), 2558 Locust Lane, Stevensville, Mich. 49127.*

57. MIXED HARDWOOD AND HEMLOCK RAVINES. — Location: Ohio; Jackson Co., Jackson Township, Sec. 23, Leo Petroglyph State Memorial; 39°07'30"N, 82°37'30"W, NW/4 Jackson Quadrangle, USGS. **Continuity:** New. **Size:** 4.86 ha = 12 acres. **Description of Plot:** Three of the 12 acres are used for parking and picnicking. The remaining 9 acres consist of relatively undisturbed second-growth forest. (The area is unglaciated Mississippian rock.) It has two distinct habitat types, a sandstone gorge habitat filled with hemlock and an upland habitat surrounding the gorge that is predominantly hardwood. The dominant canopy trees are: Red Oak (*Quercus borealis*), Hemlock (*Tsuga canadensis*), and Tulip-tree (*Lirindendron tulipifera*). This is a small unique plot and these trees and others occur in pockets where they are dominant. None are generalized throughout the area. The understory is sparse containing only a few dogwoods. The ground cover varies widely with the season grading from profuse wildflowers in spring to heavy Poison Ivy and fern cover in summer. A quantitative survey shows: trees 3 in. in diameter and over, based on 10 circular samples 193/acre; total basal area 143.8 ft²/acre. Species comprising 99% of the total number of trees: Hemlock, 46, 24, 18, 60; Sugar Maple (*Acer saccharum*), 28, 14, 5, 30; Red Maple (*A. rubrum*), 17, 9, 10, 50; Red Oak, 15, 8, 22, 50; Musclewood, 14, 7, 1, 30; White Oak, 13, 7, 9, 60; Tulip-tree, 13, 7, 15, 40; Sourwood, 9, 5, 1, 50; Dogwood, 8, 4, 5, 40; Sweet Pignut Hickory, 8, 4, 2, 60; Black Oak, 7, 4, 8, 40; Am. Beech, 4, 2, 1, 20; Mockernut Hickory, 4, 2, 2, 10; Pignut Hickory, 3, 2, 2, 20; Black Gum, 2, 1, 0.6, 10; Sassafras, 1, 0.5, 0.1, 10; Black Walnut, 1, 0.5, 2, 10. Trees by diameter size class followed by numbers per acre, relative density (%) basal area (ft²/acre), relative dominance (%): A (3-6 in.) 63, 32.6, 6.3, 4.4; B (6-9 in.) 37, 19.2, 7.8, 5.4; C (9-15 in.) 58, 30, 47.2, 32.8; D (15-21 in.) 20, 10.4, 36, 25; E (21-29 in.) 15, 7.8, 46.5, 32.3. Ground cover except under the Hemlock stands is 95%; canopy cover from 60% to 85%; average canopy height 80 ft. **Edge:** Bordered on the three high sides by pasture land or hay fields and on the fourth lowland side by an overgrown pasture with the creek exiting from the site. A 2-acre parking lot is immediately surrounding the N and E edges of the site. **Topography:** Sandstone cliffs of from 20-65 ft face the ravines and create a deep gorge through the center of the site. **Elevation:** 700-800 ft. **Weather:** Normal. **Coverage:** May 16-June 22; 7 trips. Total man-hours: 25. **Census:** Acadian Flycatcher, 3 (62, 25); Am. Robin, 3; Red-eyed Vireo, 3; Yellow-billed Cuckoo, 2; Com. Flicker, 2; Great Crested Flycatcher, 2; E. Phoebe, 2; E. Wood Pewee, 2; Tufted Titmouse, 2; Wood Thrush, 2; Blue-gray Gnatcatcher, 2; Worm-eating Warbler, 2; Scarlet Tanager, 2; Chipping Sparrow, 2; Ruby-throated Hummingbird, 1; Pileated Woodpecker, 1; Com. Crow, 1; Black-capped Chickadee, 1; White-breasted Nuthatch, 1; Brown Thrasher, 1; N. Parula, 1; Kentucky Warbler, 1; Cerulea Warbler, 1; Indigo Bunting, 1; Brown-headed Cowbird, +. **Total:** 25 species; 41 territorial males (844/km², 342/100 acres). **Remarks:** Ten nests were found: 2 flicker, 2 phoebe, 1 Acadian Flycatcher, 1 Com. Crow, 1 White-breasted Nuthatch, 2 robin, 1 Blue-gray Gnatcatcher. — *ANN BINGAMAN (compiler), TOM WOOD and ESTHER REICHELDERFER, Ohio Historical Society, 1982 Velma Ave., Columbus, Ohio 43211.*

58. LONG-LEAF PINE - WATER OAK FOREST. — Location: Mississippi; Walthall Co., 8 mi N of Tylertown; at approximately 31°8'N, 90°9'W. **Continuity:** New. **Size:** 14.6 ha = 36 acres (rectangular, unsurveyed). **Description of Plot:** The dominant canopy trees are Long-leaf Pine (*Pinus pulustris*) and Water Oak (*Quercus nigra*). The most prominent in the understory are Flowering Dogwood (Cornus florida), Holly (*Ilex opuca*), and Wax Myrtle (*Myrica cerifera*). The ground cover is primarily Broom Sedge (*Andropogon virginicus*), Greenbrier (*Smilax rotundifolia*), and Poison Oak (*Rhus toxicodendron*). A quantitative survey of vegetation yielded the following data: Trees, 4 in. diameter and over, based of the random-pairs sampling of 100 various trees: Long-leaf Pine 59%, Water Oak 24%, Sweet gum (*Liquidambar styraciflua*) 12%, Laurel Oak (*Q. laurifolia*) 3%, others less than 3%. Ground cover is approximately 85%; canopy cover is approximately 70%, with an average canopy height of about 35 ft. **Edge:** Bordered on all sides by similar forest. **Topography:** Flat land, gradually sloping toward a creek hollow. **Weather:** 77-86° and slightly humid throughout the entire census period. **Coverage:** Mar. 25-26; Apr. 1-2, 22-23; 1300-1500 hours. Total man-hours: 18. **Census:** Carolina Wren, 9 (62, 25); Mockingbird, 6 (41, 17); Bobwhite, 5 (34, 14); Wood Thrush, 5; Black Vulture, 4 (27, 11); Red-headed Woodpecker, 4; E. Kingbird, 4; Brown Thrasher, 4; Com. Flicker, 3 (21, 8); Field Sparrow, 3; Yellow-billed Cuckoo, 2; Barred Owl, 2; Blue Jay, 2; Com. Crow, 2; Red-shouldered Hawk, 1; Great Crested Flycatcher, 1. **Total:** 16 species; 57 territorial males (391/km², 158/100 acres). Special Thanks to James Sappington for help. — *MICKEY D. LUTER, 104 S. Adams St., Tylertown, Miss. 39667.*

59. MIXED PINE - HARDWOOD FOREST. — Location: Texas; Angelina Co., Angelina College property, 1.6 m S of intersection of Loop 287 and US 59; 31°17'34"N, 94°44'1"W, Lufkin Quadrangle, USGS. **Continuity:** Established 1974; 5 consecutive years. **Size:** 6.31 ha = 15.6 acres. **Description of Plot:** See *AB* 28: 1016 (1974). **Weather:** Most days had clear to partly cloudy skies; precipitation was below normal throughout spring and summer. Temperatures 65-74°F. **Coverage:** May 15-16, 22-24, 26, 29-30; 0800-0900 with an average of 60 min/trip. Total man-hours: 8. **Census:** Cardinal, 8 (127, 51); White-eyed Vireo, 6 (95, 38); Red-eyed Vireo, 3 (48, 19); Hooded Warbler, 3; Yellow-billed Cuckoo, 2; Carolina Chickadee, 2; Tufted Titmouse, 2; Red-bellied Woodpecker, 1; Downy Woodpecker, 1; Acadian Flycatcher, 1; Carolina Wren, 1; Swainson's Warbler, 1; Kentucky Warbler, 1. **Total:** 13 species; 32 territorial males (507/km², 205/100 acres). **Remarks:** No nests were found. The Red-billied Woodpecker was added to the list of probable nesters. Population densities for most species indicated little change with the exception of the Carolina Wren which seemed to have not recovered from the severe winters of 1976 and 1977. — *LOUIS DEBETAZ, Angelina College, Lufkin, Tex. 75901.*

From: Dickson & Segelquist, 1979

Table 2. Territorial male birds per km² in pine and pine-hardwood stands.ᵃ

Species	Small sapling		Sapling		Pole		Sawtimber	
	Pine	Pine-hdwd.	Pine	Pine hdwd.	Pine	Pine hdwd.	Pine	Pine hdwd.
Bobwhite	10			10				
Mourning dove		10						10
Yellow-billed cuckoo						10	10	10
Pileated woodpecker		10						
Red-bellied woodpecker		10					10	10
Red-headed woodpecker					10		10	
Downy woodpecker		10						
Great crested flycatcher		10			10			
Acadian flycatcher							5	10
Eastern wood pewee					10		10	5
Blue jay		10	10		5		10	20
Carolina chickadee		20	10		10	25	15	10
Tufted titmouse				30	10	20	50	40
Brown-headed nuthatch		10			30		10	
Carolina wren	21	30		50		45	45	40
Mockingbird	16							
Blue-gray gnatcatcher							10	20
White-eyed vireo	21	80		40		55	20	5
Red-eyed vireo						30	15	40
Black-and-white warbler				10		30	20	25
Pine warbler				20	55	35	50	20
Prairie warbler	21	25						
Worm-eating warbler								30
Common yellowthroat	42	10						
Kentucky warbler				10		10	10	15
Hooded warbler								10
Yellow-breasted chat	73	85		45				
Orchard oriole	10							
Summer tanager							15	
Cardinal	26	40	5	40		45	40	50
Blue grosbeak	31							
Indigo bunting	21			30			20	
Painted bunting	21							
Chipping sparrow					20			
Field sparrow				10				
Total	313	360	25	295	160	305	375	370

ᵃ Bird densities on the 10-ha study areas were converted to populations per 100 ha (1 km²) to facilitate comparisons. Scientific names are in Appendix Table 1.

lations had very little herbaceous or hardwood vegetation and the lowest FHD.

The small-sapling pine and pine-hardwood stands had dense vegetation near the ground and relatively high bird density and diversity. Although bird populations generally increase with advance of vegetative succession (Johnston and Odum 1956, Shugart and James 1973), lesser population peaks have been noted in early bushy stages of succession (Odum 1950, Johnston and Odum 1956, Shugart and James 1973). The pine-hardwood small-sapling stand contained a few remnant snags, and was taller and had more hardwood stems than the pine stand. Apparently this was more attractive to the Picids, white-eyed vireos, and cardinals, but less attractive to the other

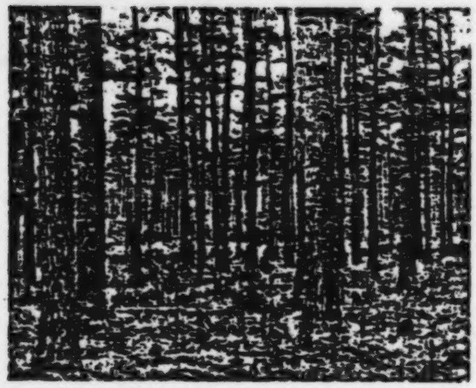
From: AB 28(6):1020-21;1974

Pewee, 0.5; Wood Thrush, 0.5; Rose-breasted Grosbeak, 0.5; Hermit Thrush, +. **Total:** 24 species; 46 territorial males or females (1006/km^2, 407 per 100 acres). **Remarks:** 3 nests were found: Mallard, Ovenbird, and junco. Total number of species was down from 26 (1972) to 24 and the density from (1520/km^2, 615 per 100 acres) to (1006/km^2, 407 per 100 acres). Two pairs of Swamp Sparrows territorial but left early in the season, replaced by Song Sparrows. The drier weather conditions greatly reduced insect populations and the bog was considerably drier than in 1972. Sharp decreases were found for: N. Waterthrush, 13 (1972) to 5; Canada Warbler 7 to 5; Com. Yellowthroat 5 to 0; Veery 6 to 1.5; Red-eyed Vireo 3 to 1 and Song Sparrow 5 to 2. Appreciable increases were noted for: Great Crested Flycatcher 1 to 3.5; Black-capped Chickadee 3 to 5; and Ovenbird 1 to 2. — J. ROBERT MILLER and LOUIS C. FARLEY III, *Hartwick College, Oneonta, N.Y. 13820.*

66. UPLAND SCOTCH PINE PLANTATION. — Location: New York; Allegany Co., 2 mi WSW of Alfred, bordering on the W side of Lake Road, adjacent to the evergreen plantings on the E side of Foster Lake; 42°7'30"N, 77°45'W, Andover Quadrangle, USGS. **Continuity:** Established 1969; 6 consecutive years. **Size:** Approximately 9.3 ha = 23 acres (roughly rectangular; 1881 ft in length, varying in width from 209 ft at the north end to 627 ft at the south end, measured with tape and compass, and divided into one-acre plots). **Description of Plot:** See *AFN* 23: 743-744, 1969. Last fall, approximately 2000 Scotch Pine trees were harvested, and there continue to be increasingly larger open spaces and more abundant growth of brambles and Choke Cherry. **Weather:** Data provided by the Alfred Cooperative Weather Station indicated that rainfall and mean temperatures during May and June did not vary significantly from the 56-year averages. Rainfall in July was considerably below normal but would have had little effect on this study. **Coverage:** April 6; May 16, 19, 25, 30; June 3, 6, 11, 13-14, 18-19; July 2, 10, 17, 25. Hours varied from 0845 to 2030, EDT, and totaled 23 man-hours. **Census:** Song Sparrow, 28 (301, 122); Chipping Sparrow, 17 (183, 74); Am. Robin, 10 (107, 43); Field Sparrow, 10; Purple Finch, 8 (86, 35); Com. Yellowthroat, 4 (43, 17); Am. Woodcock, 3 (32, 13); Rufous-sided Towhee, 3; Yellow-rumped Warbler, 2.5; Brown-headed Cowbird, 2; Cedar Waxwing, 2; Black-billed Cuckoo, 1; Tree Swallow, 1; House Wren, 1; Prairie Warbler, 1; Alder Flycatcher, +; Black-capped Chickadee, +; Gray Catbird, +. **Total:** 18 species; 93.5 territorial males (1005/km^2, 407 per 100 acres). **Remarks:** Nests found, 13: Chipping Sparrow, 4; Song Sparrow, 3; Am. Robin, 2; Tree Swallow, Black-capped Chickadee, House Wren, Yellow-rumped Warbler, 1 each. Two Song Sparrow nests contained cowbird eggs. A pair of Prairie Warblers was seen feeding two young on July 17, but no nest was found. Appreciation is extended to Eddy Foster for permission to conduct this study on his land; to Dan Stutzman, co-ownèr of the Christmas trees; to Robert Place for weather data; to Lou Burton for his photographic work; and to William Howe for assistance in the field. — ELIZABETH W. BROOKS, *Water Wells Road, Alfred Station, N.Y. 14803.*

67. PINE PLANTATION. — Location: West Virginia, Ritchie Co., about ¼ mile from Goff's farm along Fowler Road, 0.6 miles from W. Va. Rt. 16 S of Harrisville. Centerline starts at 39°11'24"N; 81°01'48"W. and extends ENE. Harrisville Quadrangle, USGS. **Continuity:** New. **Size:** 6.07 ha = 15 acres (rectangular 110 x 660 yards, approx. 100.6 x 603.5 m, measured longitudinally and estimated laterally). **Description of Plot:** A large Virginia Pine plantation (*Pinus virginiana* or hybrid of same) located on sloping hillside owned by W. Va. Pulp and Paper Co. The pines are 8-10 ft in height, estimated age 6-8 years. Scattered among the pines are shrub-sized Sassafras (*Sassafras albidum*), Dwarf Sumac (*Rhus copallina*), Staghorn Sumac (*R. typhina*), and White Ash (*Fraxinus americana*), with blackberry (*Rubus* sp.), greenbrier (*Smilax* sp.) and scattered herbaceous plants as ground cover. Based on six 0.1 acre samples, the James-Shugart method of vegetation description revealed 9883 shrub stems per acre, 100% ground cover and 0% canopy. **Edge:** Similar habitat except at distance of about 200 yards are mature deciduous trees in what appeared to be a former fence row and, on the opposite side, a mature deciduous woods at more than 200 yards distance. **Topography:** Hillside of gentle slope. Elevation between 1100 and 1150 ft. **Coverage:** June 1-6. Times: 0530 to 0730; two late morning trips and two late afternoon trips; 14 trips, about 16 party-hours. **Census:** Prairie Warbler, 8 (132, 53); YellOw-breasted Chat, 5 (82, 33); White-eyed Vireo, 4 (66, 27); Indigo Bunting, 4; Field Sparrow, 4; Rufous-sided Towhee, 3 (49, 20); Brown Thrasher, 1; Blue-winged Warbler, 1; Red-eyed Vireo, 0.5; Brewster's Warbler, 0.5; Com. Yellowthroat, +. **Total:** 11 species; 31 territorial males (511/km^2, 207 per 100 acres). — KYLE BUSH, EUGENE HUTTON, FRANK MURPHY and E. R. CHANDLER (compiler), *Brooks Bird Club, 707 Warwood Ave, Wheeling, W. Va. 26003.*

68. LOBLOLLY PINE FOREST. — Location: Louisiana; Livingston Parish, 5.6 miles SSW of Pine Grove, 0.5 miles E of State Highway 449, 30°38'N, 90°47'W, Section 11, T5S, R4E, Pine Grove Quadrangle, USGS. **Continuity:** New. **Size:** 12.14 ha = 30 acres (1143 ft^2 surveyed with a hand-held compass and measured with a fiberglass tape). **Description of Plot:** See *AB* 28:706, 1974. Ground cover during this census period was generally sparse and not over 3 ft tall except in two small areas of about 1000 ft^2 each which have not burned for several years. These two small areas supported a light ground cover, a dense midstory of mostly Sweetgum (*Liquidambar styraciflua*), hickory (*Carya* spp.) and S. Red Oak (*Quercus falcata*) and the 45-year-old Loblolly Pine (*Pinus taeda*) overstory (average height = 92 ft). The remainder of the plot offers only the Loblolly Pine overstory and the sparse ground cover. **Weather:** Temperature at start of censuses varied from 65° to 72°F and at end from 75°F to 81°F. Wind was no factor. The sky was clear during 4 censuses and at least partly cloudy during 4 others. Rainfall was near normal. **Coverage:** May 13-14, 17, 23, 27, 31; June 3-4. All trips between 0610 and 1100, CDT. Total man-hours: 28.8. **Census:** Pine Warbler, 7 (58, 23); Brown-headed Nuthatch, 4 (33, 13); Cardinal, 3 (25, 10); Red-bellied Woodpecker, 2; Red-headed Woodpecker, 2; E.



Census 68. Pure, 45 year old stand of Loblolly Pine.

Wood Pewee, 2; Carolina Wren, 2; Yellow-throated Vireo, 2; Prairie Warbler, 2; Rufous-sided Towhee, 2; Bachman's Sparrow, 2; Downy Woodpecker, 1; Acadian Flycatcher, 1; Blue Jay, 1; Tufted Titmouse, 1; E. Bluebird, 1; Summer Tanager, 1; Indigo Bunting, 1; Hairy Woodpecker, +; Great Crested Flycatcher, +; Carolina Chickadee, +. **Total:** 21 species; 37 territorial males (305/km²; 123 per 100 acres). **Remarks:** Some species were largely associated with, and concentrated around, dead trees and snags. This was true for all woodpeckers (except the Red-cockaded), Carolina Chickadee, Tufted Titmouse and E. Bluebird and to a lesser extent for the E. Wood Pewee, Acadian Flycatcher, and Brown-headed Nuthatch. These dead trees and snags result from natural mortality (mostly from lightning strikes and competition with other, more vigorous trees) in this pure, even-aged stand. Most foresters consider these dead trees and snags a fire, insect, and disease hazard to the timber stand, and for that reason they remove dead trees and snags whenever possible. However, in doing so they further decrease habitat diversity in a forest type (pure, even-aged stand) already largely devoid of such diversity. The Carolina Wrens, and Rufous-sided Towhees were found only in the small areas that have somehow escaped burning for several years. — ROBERT E. NOBLE and ROBERT B. HAMILTON, *School of Forestry and Wildlife Management, Louisiana State University, Baton Rouge, La. 70803*.

69. ASPEN CLEAR-CUT. — Location: Minnesota; St. Louis Co., 6 miles N of Island Lake Reservoir Bridge at intersection of Old County Highway 4 and Carroll Truck Trail: 47°6'30"N, 92°6'30"W, Thompson Lake Quadrangle, USGS. **Continuity:** New. **Size:** 7.5 ha = 18.53 acres (rectangular, 250 x 300 m, measured by compass and calibrated wire). **Description of Plot:** Clear-cut logged the summer of 1973, thus there are no trees standing. A large number of trees remain on the ground and the shrub layer is generally under 3 ft high. Most prominent in the shrub layer is Beaked Hazel (*Corylus cornuta*), Speckled Alder (*Alnus rugosa*), Quaking Aspen (*Populus tremuloides*), and Balsam Poplar (*P. balsamifera*). The ground cover is primarily Bracken Fern (*Pteridium aquilinum*), Large leaved N. Aster (*Aster macrophyllus*), Yellow Clintonia (*Clintonia borealis*), and various grasses (*Poa* sp). Shrub stems/acre 6,333; ground cover 85%. **Edge:** The western edge is about 150m from the Carroll Truck Trail with similar area in between. Bordered on the north and south by similar area; however, the southwest and northwest corners are within 10 to 20m of mature trees. The eastern edge is about 40m from a mature wooded area. **Topography:** A gentle sloping terrain with the center of the plot actually on a very slight knoll. **Elevation:** About 1445 to 1460 ft. **Weather:** Generally clear to partly cloudy with two censuses conducted on overcast days; no precipitation. Wind varied from force 0 to 3 with only two days greater than 2. Temperature for the period varied from 42° to 70°F. **Coverage:** June 1, 5, 7, 13, 24, 26, 28; July 1. All trips between 0500 and 0915 hours. Total man-hours: 11, plus 5 in measuring the plot. **Census:** White-throated Sparrow, 6 (80, 32); Song Sparrow, 6; Mourning Warbler, 4 (53, 22); Am. Robin, 3 (40, 16); Chestnut-sided Warbler, 2; Com. Yellowthroat, 2; Com. Snipe, 1; E. Kingbird, 1; Tree Swallow, +. **Total:** 9 species; 25 territorial males or females (333/km², 135 per 100 acres). **Remarks:** One Robin nest was located. Pishing was used quite effectively. Special thanks to Bonnie Niemi for assistance in measuring the plot. — GERALD J. NIEMI, *227 W. 4th St., Duluth, Minn. 55806*.

70. HORSE FARM AND SECOND-GROWTH EDGE. — Location: Vermont; Windsor Co., Woodstock, 0.5 mile E of Route 106 on Town Road 64; 43°35'N, 72°30'W; Woodstock Quadrangle, USGS. **Continuity:** Established 1972; 3 consecutive years. **Size:** 16.2 ha = 40 acres. **Description of Plot:** See *AB* 26:960-961, 1972; 27:1016-17, 1973. **Weather:** Cloudy, cool with occasional windy, clear days. **Coverage:** June 1, 2, 15-16, 18-24, 26-30; July 1, 6. All trips between 0630 and 1030 hours. Total man-hours: 36. **Census:** Am. Robin, 6 (37, 15); Least Flycatcher, 5 (31, 13); Barn Swallow, 5; E. Phoebe, 4 (25, 10); Wood Thrush, 4; Ovenbird, 4; Com. Yellowthroat, 4; Rufous-sided Towhee, 4; Chipping Sparrow, 4; White-throated Sparrow, 4; Song Sparrow, 4; Cliff Swallow, 3 (19, 8); Red-eyed Vireo, 3; Ruffed Grouse, 2; Black-billed Cuckoo, 2; Com. Flicker, 2; Great Crested Flycatcher, 2; White-breasted Nuthatch, 2; Brown Creeper, 2; Gray Catbird, 2; Hermit Thrush, 2; E. Bluebird, 2; Chestnut-sided Warbler, 2; Red-winged Blackbird, 2; Field Sparrow, 2; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; E. Kingbird, 1; E. Wood Pewee, 1; Tree Swallow, 1; Red-breasted Nuthatch, 1; Winter Wren, 1; Brown Thrasher, 1; Veery, 1; Black-and-white Warbler, 1; Nashville Warbler, 1; Magnolia Warbler, 1; Yellow-rumped Warbler, 1; Blackburnian Warbler, 1; House Sparrow, 1; N. Oriole, 1; Scarlet Tanager, 1; Rose-breasted Grosbeak, 1. **Total:** 44 species; 97 territorial males, (599/km², 243 per 100 acres). **Remarks:** An increase in flycatchers may have been owing to heavy infestation of birch trees. This would account for the reappearance of the Black-billed Cuckoo. Two pair of E. Bluebirds successfully raised 10 young from three nestings. A population explosion of cowbirds (50 to 55 juveniles counted) apparently cut down on the number of successful warbler

From: AB 36(1):70;1982

68. FORESTED STREAM GORGE IV. — Location: Wisconsin; Sauk Co., Baraboo Hills. Pine Hollow. T10N R5E S.4 SE, NW and NW, SW; 43°21'N, 89°54'W. Black Hawk Quadrangle, USGS. **Continuity:** New. **Size:** 19.4 ha = 47.9 acres. **Description of plot:** Y-shaped gorge, the lower 2/3 with sandstone and conglomerate cliffs, dense stands of Hemlock, and Yellow Birch. Less Hemlock, more oaks upstream and on upper slopes. White Pine scattered throughout. Importance values for canopy: Hemlock *(Tsuga canadensis)* 21, White Oak 14, Red Oak 11, Red Maple 10, Sugar Maple 10, Yellow Birch 9, Basswood 6, White Pine 6; continuum index 676; live trees/ha 513; basal area/ha 3001 dm^2; dead trees/ha 31. Importance values for understory: Witchhazel 13, Sugar Maple 13, Ironwood 8, Maple-leaved Viburnum 8, Lady Fern 6, Musclewood 5, White Ash 4, Red Maple 4; understory stems/ha 4927. Other: canopy cover 76%; ground cover 37%; mean canopy ht 23.1 m (range 12-34); cliffs (freq) 21%; emergent trees (freq) 7%; rock cover 25%. **Topography:** Relief between stream bottom and side boundaries varies from 15 to 33 m. **Coverage:** May 3, 10, 15, 28; June 7, 13, 27; July 7, 20; Aug. 10, 29. Total man-hours: 33. **Census:** Acadian Flycatcher, 18 (93, 38); Least Flycatcher, 18; Red-eyed Vireo, 18; Scarlet Tanager, 10 (52, 21); Rose-breasted Grosbeak, 9 (46, 19); E. Wood Pewee, 8 (41, 17); Blue-gray Gnatcatcher, 8; Brown-headed Cowbird, 8; Ovenbird, 7 (36, 15); Wood Thrush, 5 (26, 10); Black-capped Chickadee, 4 (21, 8); Magnolia Warbler, 4; Canada Warbler, 4; Cardinal, 4; E. Phoebe, 3 (15, 6); White-breasted Nuthatch, 3; Veery, 3; Yellow-throated Vireo, 3; Louisiana Waterthrush, 3; Am. Goldfinch, 3; Ruby-throated Hummingbird, 2; Hairy Woodpecker, 2; Blue Jay, 2; Cerulean Warbler, 2; Barred Owl, 1; Downy Woodpecker, 1; Am. Robin, 1; Blackburnian Warbler, 1; Red-shouldered Hawk, +; Red-tailed Hawk, +; Ruffed Grouse, +; Am. Woodcock, +; Yellow-billed Cuckoo, +; Whip-poor-will, +; Com. Flicker, +; Pileated Woodpecker, +; Red-bellied Woodpecker, +; Red-headed Woodpecker, +; Great Crested Flycatcher, +; Tufted Titmouse, +; Cedar Waxwing, +; Worm-eating Warbler, +; N. Oriole, +. **Total:** 43 species; 155 territorial males (800/km^2, 324/100 acres). **Remarks:** Nests found: E. Phoebe, Acadian Flycatcher, Least Flycatcher, E. Wood Pewee, Wood Thrush, Blue-gray Gnatcatcher, Yellow-throated Vireo, Red-eyed Vireo, Ovenbird, Louisiana Waterthrush.

69. MATURE ASPEN–FIR. — Location: Minnesota, Cass Co., Chippewa Nat'l Forest. SW¼ of SE¼, Sec. 10, T144N, R30W; 47°17'30"N, 94°22'30"W; Sucker Lakes Quadrangle, USGS. **Continuity:** New. **Size:** 11.2 ha = 27.6 acres. **Description of Plot:** The Quaking Aspen *(Populus tremuloides)* averages 70 ft with a sub-canopy of Balsam Fir *(Abies balsamea)* 40-55 ft high. There are scattered Green Ash *(Fraxinus pennsylvanica)* along the intermittent stream beds. The ground cover consists primarily of litter with Wild Sarsaparilla *(Aralia nudicaulis)*, Wild Ginger *(Asarum canadense)*, and various hardwood seedlings as the most common ground vegetation. **Edge:** Bordered on N, E, and S by similar vegetation. The W edge is a gravel road. **Topography:** Essentially flat with a gradual slope to E. **Elevation:** 1320-1330 ft. **Weather:** Warm, calm, and humid first 2 days; mild, breezy, and partly cloudy other days. **Coverage:** June 2-3, 15-16, 30; July 1; 0500-1100. Total man-hours: 18. **Census:** Ovenbird, 7.5 (67, 27); Black-throated Green Warbler, 3 (27, 11); Red-breasted Nuthatch, 2.5; Red-eyed Vireo, 2; Blue Jay, 1; Brown Creeper, 1; Veery, 1; Scarlet Tanager, 1; Broad-winged Hawk, 0.5; Black-capped Chickadee, 0.5; Hairy Woodpecker, +; E. Wood Pewee, +; Brown-headed Cowbird, +; Evening Grosbeak, +. **Total:** 14 species; 20 territorial males (179/km^2; 72/100 acres). **Remarks:** Nests found: Ovenbird, 2; Broad-winged Hawk, 1.—*DON RAKSTAD and JOHN R. PROBST, N. Central Forest Experiment Station, USDA Forest Service, St. Paul, MN 55108.*

70. MIXED SUCCESSIONAL ASPEN–OAK–CONIFER FOREST. — Location: Minnesota; Clearwater Co., 3.5 mi NW of intersection of state highway 200 and U.S. highway 71; 0.25 mi E of Univ. of Minnesota Forestry and Biological Station, Itasca State Park; 47°10'N, 95°12'W. Lake Itasca Quadrangle, USGS. **Continuity:** Established 1980. **Size:** 8.93 ha = 22.07 acres. **Description of Plot:** See *AB* 35: 66-67 (1981). **Coverage:** July 2, 4, 7-9, 12-13; 0500-0700 and 1900-2100. Total man-hours: 32. **Weather:** June was very rainy. The first 5 censuses were in the high 80-90s F; the last 3 had average temperatures. **Census:** Ovenbird, 18.5 (207, 84); Chestnut-sided Warbler, 10 (112, 45); Com. Yellowthroat, 10; Veery, 6 (67, 27); Red-eyed Vireo, 5.5 (62, 25); Nashville Warbler, 5.5; Yellow-bellied Sapsucker, 3 (34, 14); Great Crested Flycatcher, 3; Black-capped Chickadee, 2.5; Song Sparrow, 1.5; Mourning Warbler, 1; Indigo Bunting, 1; Chipping Sparrow, 1; Swamp Sparrow, 1; Cedar Waxwing, 0.5; Am. Goldfinch, 0.5. **Total:** 16 species; 70.5 territorial males (789/km^2, 319/100 acres). **Visitors:** Broad-winged Hawk, Ruffed Grouse, Barred Owl, Ruby-throated Hummingbird, Com. Flicker, Pileated Woodpecker, Hairy Woodpecker, E. Phoebe, Olive-sided Flycatcher, Blue Jay, Com. Crow, White-breasted Nuthatch, Red-breasted Nuthatch, Gray Catbird, Am. Robin, Golden-crowned Kinglet, Golden-winged Warbler, N. Parula; Blackburnian Warbler, Red-winged Blackbird, Brewer's Blackbird, Brown-headed Cowbird, Rose-breasted Grosbeak. **Remarks:** The water level in the Sedge Marsh was higher than last year by about ½ ft. The number of territorial males was practically identical to last year's value (71.5). Two Yellow-bellied Sapsucker nests were found. The census was done late in the breeding season for most species present, thus possibly biasing our numbers for breeding birds downward. The Icterids and Corvids had already begun to form flocks, making it impossible to gather any territorial information for those species.—*ROBERT J. BUEK and LISA C. MUELLER, 4909 Beehner Cir., Madison, WI 53714.*

71. MIXED PINE–DECIDUOUS FOREST. — Location: Louisiana; Natchitoches Par., 1 mi W of the Northwestern State Univ. campus, within the Natural History Area, on the S side of La. Rt 6, 31°44'N, 93°06'W; Provencal Quadrangle, USGS. **Continuity:** New. **Size:** 8.9 ha = 22 acres (L-shaped, measured by pacing with compass). **Description of Plot:** See *AB* 25:639-640 (1971) and 26:699 (1972). **Weather:** During the 18-day period temperatures ranged from 78-95°F with 6 count days 80° or higher. Night lows were 62-78°; 4 days were mostly cloudy and 4 were mostly sunny to sunny. Wind was moderate to calm. **Coverage:** June 9, 13-14, 16, 18-19, 22, 26; 0730-1000. **Census:** Cardinal, 8 (90, 36); White-eyed Vireo, 7 (79, 32); Blue Jay, 5; Carolina Chickadee, 5 (56, 23); Carolina Wren, 4 (45, 18); Tufted Titmouse 3; Mockingbird, 3 (34, 14); Pileated Woodpecker, 2; Am. Robin, 2; Red-eyed Vireo, 2; N. Parula, 1; Hooded Warbler, 2; Red-headed Woodpecker, 1; Wood Thrush, 1; Swainson's Warbler, 1; Sharp-shinned Hawk, +; Yellow-billed Cuckoo, +; Red-bellied Woodpecker, +; Hairy Woodpecker, +; Com. Crow, +; Yellow-breasted Chat, +. **Total:** 21 species; 47 territorial males (528/km^2, 214/100 acres).—*ELLEN M. KRUK and CHARLIE VIERS Dept. of Biological Sciences, Northwestern State Univ. of La., Natchitoches, LA 71457.*

72. YOUNG SPRUCE FOREST. — Location: Maine; Hancock Co., Deer Isle, 0.35 mi N of Stinson Point, 44°10'N, 43°W, Deer Isle Quadrangle, USGS. **Continuity:** Established 1977; 4 intermittent years. **Size:** 3.2 ha = 8 acres. **Description of Plot:** See *AB* 32:72 (1978). **Weather:** July 9-18. Temperatures and precipitation slightly above normal, range 48-86°F (8.9-30°C); mean daily min. temp. 54.5° (17.5°), mean daily max. temp. 79.4° (26.3°). Total rain 0.84 in. (2.1 cm). **Coverage:** July 9-18; 0430-2000, EST. Total man-hours: 6. **Census:** Magnolia Warbler, 6 (185, 75); Black-throated Green Warbler, 5 (154, 63); Am. Redstart, 4.5 (139, 56); White-throated Sparrow, 3 (93, 38); Black-capped Chickadee, 2 (62-65); Dark-eyed Junco, 2; Winter Wren, 1.5; Cedar Waxwing, 1.5; Black-and-white Warbler, 1.5; Nashville Warbler, 1.5; Blue Jay, 1; Red-breasted Nuthatch, 1; Am. Robin, 1; Swainson's Thrush, 1; N. Parula, 1; Olive-sided Flycatcher, +; Boreal Chickadee, +; Tennessee Warbler, +; Yellow-rumped Warbler, +; Ovenbird, +. **Total:** 20 species; 33.5 territorial males (1035/km^2, 419/100 acres). **Visitors:** Com. Flicker, Downy Woodpecker, E. Kingbird; Com. Crow; Starling, E. Wood Pewee, Pine Siskin, White-winged Crossbill. **Remarks:** Because of lateness of coverage, some species may have been classified as visitors rather than residents.—*KENNETH L. CROWELL, Sunset, ME 04683.*

73. RED PINE PLANTATION. — Location: Connecticut; Litchfield Co., White Memorial Foundation, Morris; 41°42'30"N, 73°10'W, Litchfield Quadrangle, USGS. **Continuity:** Established 1978; 4 consecutive years. Size: 8.5 ha = 21 acres. **Description of Plot:** See *AB* 33:72 (1979). **Coverage:** Apr. 9; June 2-5, 7, 10. Total man-hours: 11. **Census:** Com. Yellowthroat, 7 (82, 33); Song Sparrow, 6 (71, 29); Gray Catbird, 5 (59, 24); Blue-winged Warbler, 5; Chestnut-sided Warbler, 5; Rufous-sided Towhee, 5; N. Oriole, 4.5

APPENDIX B OF THE HABITAT QUALITY ASSESSMENT
CLEAR-CUT CENSUSES

From: AB 29(6):1117-18;1975

100 acres). **Remarks**: Nests found: House Wren, 3; Am. Robin, 2; Mourning Dove, 1; Black-capped Chickadee, 1; Starling, 1; House Sparrow, 1; Com. Grackle, 1; Cardinal, 1. Several species showed a decline in number compared with last year. — JOAN E. ESPENSCHIED, *3056 Swamp St., Hartville, Ohio 44632.*

88. HICKORY-MAPLE PARK WOODLAND. — **Location**: Ohio; Guernsey Co., approximately ¼ mile from the registration station for the camping area of Salt Fork State Park; 40°6′18″N, 81°30′8″W, Cambridge Quadrangle, USGS. **Continuity**: New. **Size**: 6.1 ha = 15 acres (rectangular 1980 x 330 ft, measured longitudinally and estimated laterally). **Description of Plot**: The dominant canopy trees are Sugar Maple (*Acer saccharum*) and Mockernut Hickory (*Carya tomentosa*). Most prominent in the understory are Poison Ivy (*Rhus radicans*) and blackberries (*Rubus* sp.). Among the ground cover plants are many ferns including Christmas Fern (*Polystichum acrostichoides*) and Rattlesnake Fern (*Botrychium virginianum*). A quantitative survey of the vegetation gave the following results: Trees 3-inches diameter and over, based on six circular samples, 214/acre; total basal area 68 ft^2/acre. Species comprising 92% of the total number of trees: Sugar Maple, 25, 12, 13, 67; Mockernut Hickory, 18, 8, 12, 50; Red Oak (*Quercus rubra*), 8, 4, 9, 33; Red Elm (*Ulmus rubra*), 35, 16, 8, 83; Am. Elm (*U. americana*), 23, 11, 8, 67; White Oak (*Q. alba*), 7, 3, 6, 50. Am. Hornbeam (*Carpinus caroliniana*), 27, 13, 4, 67; Black Cherry (*Prunus serotina*), 13, 6, 4, 67; Black Oak (*Q. velutina*), 12, 6, 3, 17; Shagbark Hickory (*C. ovata*), 10, 5, 4, 17; dead trees, 17, 8, 24, 67. Trees by diameter size class: A (3-6 in.) 130, 60, 13, 19; B (6-9 in.) 55, 26, 17, 25; C (9-15 in.) 22, 10, 17, 25; D (15-21 in.) 5, 2, 9, 13; G (33-40 in.) 2, 1, 12, 18. Shrub stems/acre 4758; ground cover 74.6%; canopy cover 85%; average canopy height 70 ft (range 48-82). **Edge**: Bordered on one side by similar habitat and on the other by young deciduous brushland about 25 ft high. **Topography**: Centerline of the plot is essentially E-W, following the N slope of a hill for half the length and following a stream between hills for the other half. **Elevation**: From 980 to 880 ft. **Weather**: Hot and humid with thundershowers every afternoon. **Coverage**: May 24-29; 10 trips between dawn and 0900, the others at dusk. Total 17 trips, 13 party-hours. **Census**: Red-eyed Vireo, 6 (99, 40); Acadian Flycatcher, 5.5 (91, 37); Cerulean Warbler, 3 (49, 20); Indigo Bunting, 3; Cardinal, 2.5; E. Wood Pewee, 2; Blue-gray Gnatcatcher, 2; Rufous-sided Towhee, 2; Wood Thrush, 1.5; Yellow-throated Vireo, 1.5; Blue-winged Warbler, 1.5; Great Crested Flycatcher, 1; Carolina Chickadee, 1; Tufted Titmouse, 1; House Wren, 1; Carolina Wren, 1; Louisiana Waterthrush, 1; Kentucky Warbler, 1; Scarlet Tanager, 1; Field Sparrow, 1; Yellow-breasted Chat, 0.5; Turkey Vulture, +; Broad-winged Hawk, +; Ruffed Grouse, +; Whip-poor-will, +; Ruby-throated Hummingbird, +; Pileated Woodpecker, +; Red-bellied Woodpecker, +; Downy Woodpecker, +; Blue Jay, +; White-breasted Nuthatch, +; Am. Redstart, +; Brown-headed Cowbird, +; Am. Goldfinch, +. **Total**: 34 species; 40 territorial males (659/km^2, 267/100 acres). **Remarks**: Two nests were located: Blue-gray Gnatchatcher and E. Wood Pewee. This study was undertaken in the camping area of a state park along a hiking trail that is used by the public. — GREG and ANN EDDY and GLEN PHILLIPS (compiler), *Brooks Bird Club, 707 Warwood Ave., Wheeling, W. Va. 26003.*

89. SEEDED STRIP MINE. — **Location**: West Virginia, Raleigh Co. about 5 miles SE of Shady Springs. The centerline starts at 37°40′48″N, 81°01′34″W, Shady Springs Quadrangle, USGS, and extends SW. **Continuity**: New. **Size**: 11.1 ha = 27.5 acres (rectangular, measured longitudinally and estimated laterally). **Topography**: Level at 2800 ft. **Description of Plot**: A portion of a strip mining operation which girds White Oak Mountain about 100 ft below the crest. The area was stripped for coal in 1970 and reclamation began the following spring. Tall grasses dominate the vegetation except for a row of Russian Olive (*Elaeagnus angustifolia*) which extends the full length of the plot and a few Black Locust (*Robinia pseudo-acacia*) which have reached the height of about 5 ft. The ground cover is composed of Canada Blue Grass (*Poa compressa*), Orchard Grass (*Dactylis glomerata*), Meadow Fescue (*Festuca elatior*), Hairy Vetch (*Vicia villosa*), Dwarf Plantain (*Plantago Virginica*) and Com. Ragweed (*Ambrosia artemisiifolia*). Two small plots about 20 x 50 ft are planted in corn. **Edge**: Bounded on the W by a 20 ft high wall ascending to the edge of the forest. The E edge terminates in a steep drop off caused by the leveling of the land. Access is by a road which runs through the entire plot and was used as the centerline. Crowns and stumps of the trees removed prior to the stripping remain along the road just before entering the study plot. The strip mine continues on around the mountain with undisturbed forest land on both sides. **Weather**: Seasonably warm and dry throughout the period. **Coverage**: May 31; June 1-5; between 0600 - 1050. **Total man-hours**: 14. **Census**: Vesper Sparrow, 2; Field Sparrow, 2; Com. Flicker, 1; Rough-winged Swallow, 1; Indigo Bunting, 1; Song Sparrow, 1; Rufous-sided Towhee, 0.5; Chipping Sparrow, +. **Total**: 8 species; 8.5 territorial males (76/km^2, 31/100 acres). **Remarks**: Nests found: Com. Flicker and Rough-winged Swallow. This study plot is typical of strip mining operations in Raleigh County where most of the mining operations are located near the crest of the mountains with undisturbed forest land on both sides. This particular plot is planted for wildlife. — NEVADA LAITSCH (compiler) *Brooks Bird Club, 707 Warwood Ave., Wheeling, W. Va. 26003.*

90. DECIDUOUS CLEARCUT. — **Location**: Tennessee; Washington Co.; Horse Cove Gap; about 4.5 miles S of Johnson City; 36°14′N, 82°22′W, Erwin Quadrangle, USGS. **Continuity**: New. **Size**: 20.23 ha = 50 acres (irregular, acreage determined by dot grid). **Description of Plot**: The area was clearcut in the spring and summer of 1974. A dirt road winds through the area. Vegetation consists predominantly of seedlings and stump sprouts. Fallen trees and brush made walking through the area extremely difficult, therefore a quantative survey of the vegetation was not made. The most abundant tree seedlings and sprouts are Red Maple (*Acer rubrum*), Tulip-tree (*Liriodendron tulipifera*), and Black Locust (*Robinia pseudo-acacia*). Present but less prominent are White Pine (*Pinus strobus*), Sourwood (*Oxydendrum arboreum*), White Oak (*Quercus alba*), Black Oak (*Q. velutina*), N. Red Oak (*Q. borealis*), *Sassafras albidum*, hickory (*Carya* spp.), and Am. Chestnut (*Castanea dentata*). Prominent shrubby species include Rosebay Rhododendron (*Rhododendron maximum*), Mountain Laurel (*Kalmia latifolia*), Pokeweed (*Phytolacca americana*), and blackberry (*Rubus* sp.). White Pine was planted by the Forest Service. A small isolated stand of trees in the western half was about 100 ft in diameter and included Red Maple, White Oak, Black Oak, Umbrella tree (*Magnolia fraseri*), and hickory. Flowering Dogwood (*Cornus florida*), Rosebay Rhododendron, and Mountain Laurel were present in the understory. **Edge**: Surrounded by a mature hardwood forest. The census was not conducted within 50 ft of the forest edge. **Topography**: On the SE slope of a ridge. The elevation varied from 2240 to 2560 ft. **Weather**: Warm and wet. About 1.4 inches of rain for the 8-day census period. **Coverage**: May 30-31; June 1-6; between 0600 and 0745. Total man-hours: 9.5. **Census**: Indigo Bunting, 9 (44, 18); Rufous-sided Towhee, 6 (30, 12); Carolina Wren, 5 (25, 10); Yellow-breasted Chat, 4 (20, 8); Cardinal, 2; Ruby-throated Hummingbird, 1; E. Wood Pewee, 1; Blue-gray Gnatcatcher, 1; Red-eyed Vireo, 1; Black-and-white Warbler, 1; Prairie Warbler, 1; Hooded Warbler, 1; Scarlet Tanager, +. **Total**: 13 species; 33 territorial males (163/km^2, 66/100 acres). **Remarks**: Thanks to the U. S. Forest Service (Unaka Ranger Dist.) for information concerning the acreage of the clearcut. — RICHARD P. LEWIS, and ALAN B. SMITH, *7017 Northshore Drive, Knoxville, Tenn. 37919*.

91. MIXED DECIDUOUS-PINE AND PASTURELAND. — Location: Mississippi; Oktibbeha Co., Mississippi State University South Farm, 3 miles SW of the main campus. **Continuity**: Established 1971; 5 consecutive years. **Size**: 11.7 ha = 29 acres. **Description of Plot**: See *AB* 27: 988-989, 1973. **Weather**: Temperature ranged from 52 to 91°F; 8 count days had clear skies, 5 had scattered clouds, and 2 were overcast. **Coverage**: May 10-June 15; 15 trips of 2 hours each, ranging from 0600 to 2000 hours, CST. **Total:** 30 man-hours. **Census**: Red-winged Blackbird, 12 (102, 41); Com. Grackle, 10 (85, 34); E. Meadowlark, 9 (77, 31); Mourning Dove, 8 (68, 28); Killdeer, 7 (60, 24); Blue Jay, 7; E. Kingbird, 6 (51, 21); Bobwhite, 5 (43, 17); Com. Nighthawk, 4 (34, 14); Chimney Swift, 4; Mockingbird, 4; House Sparrow, 4; Cardinal, 4; Rufous-sided Towhee, 4; Red-bellied Woodpecker, 3 (26, 10); E. Wood Pewee, 3; Barn Swallow, 3; Carolina Chickadee, 3; Brown Thrasher, 3; Indigo Bunting, 3; Field Sparrow, 3; Rock Dove, 2; Yellow-billed Cuckoo, 2; Great Crested Flycatcher, 2; Com. Crow, 2; Tufted Titmouse, 2; Am. Robin, 2; Red-eyed Vireo, 2; Green Heron, 1;Am. Kestrel, 1; Screech Owl, 1; Chuck-will's-widow, 1; Com. Flicker, 1; Red-headed Woodpecker, 1; Carolina Wren, 1; Gray Catbird, 1; Blue-gray Gnatcatcher, 1; Loggerhead Shrike, 1; Pine Warbler, 1; Orchard Oriole, 1; Summer Tanager, 1; Turkey Vulture, +; Red-tailed Hawk, +. **Total**: 43 species; 136 territorial males (1159/km^2, 469/100 acres). — JAMES N. SAPPINGTON, *Dept. of Zoology, Mississippi State Univ., Mississippi State, Miss. 39762*.

92. ARBORETUM. — Location: Louisiana; Lincoln Parish, Ruston; School of Forestry, Louisiana Tech University Arboretum; S of Reese Hall and U. S. Highway 80, 32°31'N, 92°39'W (sec 35, T 18N, R3W). **Continuity**: New. **Size**: 14.6 ha = 36 acres (irregular,roughly rectangular, approximately 1200 x 1900 ft). **Description of Plot**: See *AB* 29: 1975. The 14-acre lake was not included. **Weather**: Temperatures were in the 60s and 70s°F. Wind speeds varied between 2 and 11 mph. Four counts were conducted with cloud cover 0-10% and four with cloud cover greater than 85%. **Coverage**: May 4, 8, 10, 17-18, 22-24; between 0603 and 1005 hours. Total man-hours: 17. **Census**: Red-winged Blackbird, 19 (130, 53); Mockingbird, 10 (69, 28); Brown Thrasher, 7.5 (51, 21); Orchard Oriole, 7 (48, 19); E. Meadowlark, 4.5 (31, 13); Cardinal, 4.5; Bobwhite, 4 (27, 11); Carolina Wren, 4; Mourning Dove, 3 (21, 8); Blue Jay, 3; Loggerhead Shrike, 3; White-eyed Vireo, 3; Com. Grackle, 3; Yellow-billed Cuckoo, 2.5; Am. Robin, 2; N. Oriole, 2; Red-headed Woodpecker, 1.5; Great Crested Flycatcher, 1.5; E. Kingbird, 1; E. Wood Pewee, 1; Rough-winged Swallow, 1; Gray Catbird, 1; Starling, 1; Kentucky Warbler, 1; Com. Yellowthroat, 1; Red-bellied Woodpecker, 0.5. **Total**: 26 species; 92.5 territorial males or females (635/km^2, 257/100 acres). **Remarks**: Nests located: Brown Thrasher, 16; Red-winged Blackbird, 12; Mockingbird, 8; Loggerhead Shrike, 7; Mourning Dove, 5; Cardinal, 5; Am. Robin, 3; Blue Jay, 2; Bobwhite, 2; E. Meadowlark, 2; Red-bellied Woodpecker, 1; E. Kingbird, 1; Rough-winged Swallow, 1; Orchard Oriole, 1; Com. Grackle, 1. Grass mowing during the breeding season limited ground nesting birds. — JAMES G. DICKSON, School of Forestry; JOHN W. GOERTZ, Dept. of Zoology, *Louisiana Tech Univ., Ruston, La. 71270*.

93. IMPOUNDED BAYOU-GUM-OAK-BEECH FOREST. — Location: Louisiana; Evangeline Parish; Miller's Lake; 15.9 km NW of Ville Platte. The S boundary is 1.8 km N of the west Miller's Lake spillway; 30°46'N, 92°23'W, Section 45, T3S, R1E, Turkey Creek, La. Quadrangle, USGS. **Continuity**: New. **Size**: 10 ha = 24.7 acres (20,000 x 50 m, measured longitudinally and estimated laterally). **Description of Plot**: Composed of two habitats. One is bayou (19%); the other is gum-oak-beech forest on the bayou's natural banks; located within a 1300+ ha man-made lake. A quantitative survey based on 100 randomly located .01 ha (radius = 5.6 m) circular plots gave the following results: 704 trees/ha with a dbh 7.5 cm and over; basal area, 26.6 m^2/ha. Overstory species are: Sweet-gum (*Liquidambar styraciflua*), 47%; Blue-beech (*Carpinus caroliniana*), 14%; Water Oak (*Quercus nigra*), 12%; Carolina Ash (*Fraxinus caroliniana*), 8%; Laurel Oak (*Q. laurifolia*), 2%; and Red Maple

From: AB 31(1):62;1977

Carolina Wren, 1.5; E. Meadowlark, 1.5; Am. Woodcock, 1; Com. Flicker, 1; E. Kingbird, 1; E. Wood Pewee, 1; Willow Flycatcher, 1; Carolina Chickadee, 1; House Wren, 1; Am. Robin, 1; E. Bluebird, 1; Starling, 1; N. Oriole, 1; Summer Tanager, 1; Black-billed Cuckoo, 0.5; Yellow-throated Warbler, 0.5; Barn Owl, +; Downy Woodpecker, +; Great Crested Flycatcher, +; Kentucky Warbler, +; Rufous-sided Towhee, +. **Total:** 39 species; 130 territorial males (763/km^2, 309/100 acres). **Remarks:** The considerable species number and density doubtless relate to the patchy nature of the habitat and extensive edges at this stage of oldfield succession. Juanita R. Webster and several students helped with the census work, but their time was not calculated above. — *J. DAN WEBSTER, Hanover College, Hanover, Ind. 47243.*

85. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., Horse Cove Gap; about 4.5 mi. S of Johnson City; 36°14′N, 82°22′W, Erwin Quadrangle, USGS. **Continuity:** Established 1975. **Size:** 20.23 ha = 50 acres (irregular, acreage determined by dot grid). **Description of Plot:** See *AB* 29:1117-8 (1975). **Weather:** A very dry spring. **Coverage:** May 28, 30-31; June 1-2, 4-5; between 0600 and 0745. Total man-hours: 7. **Census:** Indigo Bunting, 9 (44, 18); Rufous-sided Towhee, 7 (35, 14); Carolina Wren, 4 (20, 8); Yellow-breasted Chat, 4; Kentucky Warbler, 2; Ruby-throated Hummingbird, 1; E. Wood Pewee, 1; Red-eyed Vireo, 1; Black-and-white Warbler, 1; Cardinal, 1; Song Sparrow, 1; Downy Woodpecker, +; White-eyed Vireo, +; Hooded Warbler, +. **Total:** 14 species; 32 territorial males (158/km^2, 64/100 acres). **Remarks:** No significant change was noted in the vegetation. New territorial species were the Downy Woodpecker, White-eyed Vireo, and Song Sparrow. — *RICHARD LEWIS, Rte. 3, Box 683B, Erwin, Tenn. 37650.*

86. ROADSIDE: DREDGED MATERIAL DISPOSAL SITE. — Location: Louisiana; St. Martin Parish; Atchafalaya Basin; along LA 975 and two access roads, 2.1 mi. N of I-10; 30°23′N, 91°39′W, Maringouin Quadrangle, USGS. **Continuity:** New (1975). **Size:** 7.24 ha = 17.9 acres (transect line, oriented along road centerlines, 5200 x 150 ft, paced). **Description of Plot:** Vegetation sampled in July 1974 using a random quadrat method for shrubs and herbaceous plants and the Bitterlich method for trees. Essentially a forest edge situation. An herbaceous association dominated by S. Ragweed (*Ambrosia bidentata*) and White Clover (*Trifolium repens*) comprises 45% (8.2 acres) of the plot, borders one access road and generally the first 25 ft to either side of LA 975. Other prominent herbs are Com. Ragweed (*A. artemisiifolia*), Goldenrod (*Solidago altissima*), and *Verbena brasiliensis*. Percent cover by each is: S. Ragweed, 80; White Clover, 76.7; Com. Ragweed, 10; Goldenrod, 6.7; Verbena, 3.3. Floodplain forest, dominated by Black Willow (*Salix nigra*) and Sycamore (*Platanus occidentalis*), or Black Willow and Cottonwood (*Populus deltoides*) comprises 54% (9.7 acres). This community borders the other access road and the S. Ragweed-White Clover habitat along LA 975 (except for a 500 ft strip along the E side of LA 975 which was cleared in the early 1960s for oil exploration; the area is now occupied by S. Ragweed-White Clover). See Census 51 for a description of the woodlands. The census area was used as a dredged material disposal site in 1935 and 1936 during construction of the Whiskey Bay Pilot Channel. A very minor disposal also took place in 1962 when the channel was subject to maintenance dredging. LA 975 was constructed in 1969-1970. Vegetation along LA 975 is routinely sprayed to maintain a road and powerline right of way. **Edge:** A 1.6 acre pond is located just beyond the plot boundary in the area cleared for oil exploration. Floodplain forest borders the rest. **Topography:** Gently rolling from N to S. **Elevation:** Varying from 25 ft to 45 ft. **Weather:** Thunderstorms, accompanied by high winds, struck the area on the first night of the census, causing numerous trees to break and fall and probably some mortality to clutches. Overcast conditions occurred on 5 census days with light, intermittent rain falling on 2 days. Clear conditions prevailed on all other days. Morning temperatures were in the upper 60s and low 70s F. Winds were calm except on one day when gusts reached 30 mph. **Coverage:** May 7-14; 0600-0830. Total man-hours: 15.5. **Census** (1975): Yellow-breasted Chat, 15.5 (214, 87); Indigo Bunting, 10 (138, 56); White-eyed Vireo, 9.5 (131, 53); Painted Bunting, 6.5 (90, 36); Cardinal, 3.5 (48, 20); Ruby-throated Hummingbird (females), 3 (41, 17); Com. Yellowthroat, 3; Prothonotary Warbler, 2.5; Hooded Warbler, 2.5; Carolina Wren, 2; Red-eyed Vireo, 2; Brown-headed Cowbird (females), 2; Orchard Oriole, 2; Rufous-sided Towhee, 1.5; N. Parula, 1; Red-bellied Woodpecker, 0.5; Red-shouldered Hawk, +; Com. Flicker, +; Downy Woodpecker, +; Wood Thrush, +; Kentucky Warbler, +; Summer Tanager, +; Red-winged Blackbird, +. **Total:** 23 species, 67 territorial males or females (925/km^2, 374/100 acres). **Remarks:** This census was performed to gather baseline data for description of plant and animal succession patterns on U. S. Army, Corps of Engineers (COE) dredged material disposal sites, and was supported by the COE, Waterways Experiment Station, Vicksburg, MS under grant number DACW 39-74-C-0092. — *STEPHEN B. ATKINS, RONALD G. PSCION, DAVID M. DuMOND,* and *STEVEN W. LEONARD, Coastal Zone Resources Corp., Wilmington, N.C. 28401.*

87. KENTUCKY BLUE GRASS PRAIRIE. — Location: North Dakota; Stutsman Co., NE quarter of Sect. 12, T142N, R68W, New Rockford Quadrangle, USGS. **Continuity:** Established 1972; 5 consecutive years. **Size:** 4.84 ha = 12 acres (rectangular, 201 x 241 m, paced). **Description of Plot:** See *AB* 26:972 (1972). Following a prescribed burn in fall 1972, the vegetation has continued to grow and the ground litter accumulate. The plot remains nearly devoid of shrubby vegetation. **Weather:** Precipitation totaled only 0.72 in. in May and 2.67 in. in June. Temperatures in May were slightly above normal, with an average high of 69° and an average low of 41°F. June was warmer than normal, with average extremes of 80° and 54°. All censuses were made in periods of low winds. Many pond basins were dry at the beginning of the census period; others dried up during the warm weather in June. **Coverage:** May 26; June 7, 8, 16, 18, 23; 10 trips, 0805-1050 hours, CDT. Total man-hours: 3. **Census:** Red-winged Blackbird, 1.5; Bobolink, 1; W. Meadowlark, 1; Brown-headed Cow-

From: AB 32(1):80;1978

thanks to David Steingraeber for the quantitative habitat description and Charles Weise for general assistance. — *VERNON D. AUNE. S. 13. W. 22167 Ridge Road. Waukesha. Wis. 53186.*

79. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., House Cove Gap; about 4.5 mi S of Johnson City; 36°14′N. 82°22′W. Erwin Quadrangle. USGS. **Continuity:** Established 1975; 3 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB:* 1117-8 (1975). **Weather:** Generally warm and clear. **Coverage:** May 27-31; June 3-4. 6. 8; 0600-0800. Total man-hours: 13. **Census:** Indigo Bunting. 13 (64. 26); Rufous-sided Towhee. 8 (40. 16); Yellow-breasted Chat. 6 (30. 12); White-eyed Vireo. 4 (20. 8); Kentucky Warbler. 4; Hooded Warbler. 4; Prairie Warbler. 3 (15. 6); Ruby-throated Hummingbird. 2; Cardinal. 2; Com. Flicker. 1; E. Wood Pewee. 1; Blue-gray Gnatcatcher. 1; Red-eyed Vireo. 1; Black-and-white Warbler. 1; Chestnut-sided Warbler. 1; Brown-headed Cowbird (female). 1; Downy Woodpecker. +. **Total:** 17 species; 53 territorial males or females (262/km^2. 106/100 acres). **Remarks:** Nest found. Com. Flicker. An increase of 65% in total density from last year was observed. some of the most noted increases included Indigo Bunting (9 to 13), White-eyed Vireo (+ to 4). Kentucky Warbler (2 to 4). Hooded Warbler (+ to 4). and Prairie Warbler (0 to 3). Carolina Wren. which was present in good numbers in the two previous censuses (5 in 1975 and 4 in 1976). was absent this year. The Chestnut-sided Warbler. which normally nests above 3500 ft elevation in this area. was unusual here (2400 ft). — *RICHARD LEWIS. Rte. 3. Box 683B. Erwin, Tenn. 37650.*

80. PASTURES WITH BRUSH, WOODED STRIPS, AND SCATTERED TREES. — Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob: 36°9′45″N. 85°22′W, Monterey Quadrangle. USGS. **Continuity:** New. **Size:** About 8.7 ha = 21.5 acres (very irregular. surveyed with steel tape). **Description of Plot:** The 6 pastures (separated by hedgerows or wooded strips) are dominated by Fescue (*Festuca elatior*) in the less steep portions. Broomsedge (*Andropogon virginicus*) is abundant as are numerous other grasses and forbs. Scattered trees 3 to 15 in. dbh are in all the pastures; saplings are numerous in the brushy areas (mostly on steeper slopes). Frequent tree species are: Tulip-tree (*Liriodendron*). Flowering Dogwood (*Cornus florida*). Redbud (*Cercis*). Red Cedar (*Juniperus virginiana*). Virginia Pine (*Pinus virginiana*). Sourwood (*Oxydendrum*). Persimmon (*Diospyros*). Tupelo (*Nyssa sylvatica*). *Sassafras.* Red Maple (*Acer rubrum*). White Ash (*Fraxinus americana*). Winged Elm (*Ulmus alata*). Sycamore (*Platanus*). White Oak (*Quercus alba*) and other oaks. hickories (*Carya* spp.). Hornbeam (*Carpinus*). and Buckthorn (*Rhamnus caroliniana*). The bottomland wooded strips include many of the above trees. also Black Walnut (*Juglans nigra*). Beech (*Fagus*). Sugar Maple (*A. saccharum*). Buckeye (*Aesculus octandra*), Slippery Elm (*U. rubra*), and hackberry (*Celtis* sp.). Other numerous woody plants on the plot are brambles (*Rubus* spp.), Winged Sumac (*Rhus copallina*). Spicebush (*Lindera benzoin*). Strawberry-bush (*Euonymus americanus*). Prairie Rose (*Rosa setigera*). wild grapes (*Vitis* spp.). greenbrier (*Smilax* spp.). Honeysuckle (*Lonicera japonica*). Poison Ivy (*Rhus radicans*), and Cane (*Arundinaria gigantea*). Ground cover about 80 to 95%. Rocks. either detached or outcropping. of sandstone. limestone. or chert. are frequent. A rocky. usually dry creek crosses the plot; a jeep trail follows the bottom land and joins an improved dirt road at the NW end. **Edge:** Bordered on W by similar habitat; on other sides by woods or mixed-mesophytic forest. **Topography:** Gentle to rather steep (25%) slopes. **Elevation:** 1075-1280 ft. **Weather:** Rather hot. some dry spells (no severe drought). **Coverage:** May 11-12. 27. 31; June 2. 5-6. 17. 21; 0530-0900 (CDT). and 1930-2030. Total man-hours: 20½. **Census:** Indigo Bunting, 8.5 (98. 40); Field Sparrow, 5 (57. 23); Yellow-breasted Chat. 4.5 (52. 21); White-eyed Vireo. 4 (46. 19); Blue-gray Gnatcatcher. 3.5 (40. 16); Prairie Warbler. 3 (34. 14); Red-eyed Vireo. 2.5; E. Wood Pewee. 2; Rufous-sided Towhee. 2; Cerulean Warbler. 1.5; Summer Tanager. 1.5; Ruby-throated Hummingbird. 1; Kentucky Warbler. 1; Com. Yellowthroat, 1; Cardinal. 1; Am. Goldfinch. 1; Yellow-billed Cuckoo. 0.5; Downy Woodpecker. 0.5; Tufted Titmouse. 0.5; Brown-headed Cowbird. 0.5; Red-tailed Hawk. +; Broad-winged Hawk. +; Screech Owl. +; Whip-poor-will. +; Red-bellied Woodpecker. +; Hairy Woodpecker. +; Acadian Flycatcher. +; Carolina Chickadee. +; Yellow-throated Vireo. +; Scarlet Tanager. +. **Total:** 30 species; 45 territorial males or females (517/km^2. 209/100 acres). **Visitors:** Turkey Vulture. Sharp-shinned Hawk. Chimney Swift. Barn Swallow. Purple Martin. Com. Crow. E. Bluebird. **Remarks:** No active nests located. Young Field Sparrows were numerous. About 25-30 beef cattle grazed the plot throughout the period. — *RICHARD W. SIMMERS. JR., 128 Shipley St., Cookeville, Tenn. 38501.*

81. DECIDUOUS CLEARCUT. — Location: Georgia; Rabun Co.; Chattahoochee National Forest; 5 mi S of Clayton; Tiger Quadrangle. USGS. **Continuity:** New. **Size:** 6.88 ha = 17 acres (irregular. measured with tape). **Description of Plot:** The area was clearcut in 1974. Roads bulldozed and occasional trees left standing were Dogwood (*Cornus florida*). Sourwood (*Oxydendrum arboreum*). Serviceberry (*Amelanchier laevis*). The dominant sprout growth is from Red Maple (*Acer rubrum*). Black Gum (*Nyssa sylvatica*). Tulip-tree (*Liriodendron tulipifera*). Chestnut Oak (*Quercus prinus*). Black Locust (*Robinia pseudo-acacia*). Common shrubby species are Mountain Laurel (*Kalmia latifolia*). blackberry (*Rubus* sp.), Blueberry (*Vaccinium vacillans*). **Edge:** Bordered on the N by clearcut; E. W. S by mature forest; SE by graveled Eastman Mtn Road. The census was not conducted within 50 ft of the forest edge or the road. **Topography:** On the SE slope of Boggs Mountain. **Elevation:** 2160-2360 ft. **Weather:** Extremely hot and dry; rainfall below normal. **Coverage:** April 28; May 13-15. 22. 28-29; June 4-5. 10-11. 25; July 3; 0700-1200. Total man-hours: 21. **Census:** Rufous-sided Towhee. 10 (145. 59); Prairie Warbler. 4 (58. 24); Indigo Bunting. 3 (44. 18); Mourning Dove. 1; Carolina Wren. 1; Brown Thrasher. 1; E. Bluebird. 1; Yellow-breasted Chat. 1. **Total:** 8 species; 22 territorial males (320/km^2. 129/100 acres). **Visitors:** Ruffed Grouse. Bobwhite. Yellow-billed Cuckoo. Ruby-throated Hummingbird. Com. Flicker. Hairy Woodpecker. Great Crested Flycatcher. E. Phoebe. Blue Jay. Carolina Chickadee. Solitary Vireo. Red-eyed Vireo. Black-and-white Warbler. Pine Warbler. Ovenbird. Hooded Warbler. Brown-headed Cowbird. Scarlet Tanager. Cardinal.

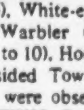
From: AB 33(1):78;1979

11-12, 14, 18, 21-22, 24-25, 27-31; June 1-3. Total hours: 80. **Census:** Red-winged Blackbird, 19 (193, 78); Song Sparrow, 5 (51, 21); Cardinal, 3; Willow Flycatcher, 2; Yellow Warbler, 2; Com. Yellowthroat, 2; E. Meadowlark, 2; Mockingbird, 1; Gray Catbird, 1; Brown Thrasher, 1; House Wren, 1; Am. Robin, 1; Starling, 1; House Sparrow, 1; Field Sparrow, 1. **Total:** 15 species; 43 territorial males (437, 177). **Visitors:** Barn Swallow, Com. Grackle, Am. Goldfinch. **Remarks:** Nests: Red-winged Blackbird, 9; Cardinal, 1. — *WAYNE HUGHES, JOEL KATZ, JON KURTZ, DAVID STORER, AMIE TROBAUGH, Biol. Dept., Earlham College, Richmond, Ind. 47374.*

83. OLD FIELD WITH BRUSH PATCHES. — **Location:** Indiana; Jefferson Co., Clifty Falls State Park.,NW corner at 38° 45'11"N, 85°24'52"W; in Sect. 33, T4N, R10E, Clifty Falls Quadrangle, USGS. **Continuity:** Established 1976; 2 intermittent years. **Size:** 17.05 ha = 42.13 acres (irregular rectangle, measured with steel tape and compass). **Description of Plot:** See *AB* 30:1056-1057 (1976) and 31:61-62 (1977). Succession in the last 2 years has increased tall forbs, decreased grasses, and made few changes in woody plants. **Weather:** Six times clear and 4 cloudy; no precipitation during counts; temperatures 52-79°F; winds Beaufort 0 to 3 (mostly 1); about average weather for the dates. **Coverage:** May 26-27, 29, 31; June 1, 8-9, 18. Total man-hours: 27. **Census:** Field Sparrow, 16 (94, 38); Com. Yellowthroat, 15.5 (91, 37); Indigo Bunting, 9 (53, 21); Yellow-breasted Chat, 8 (47, 19); Song Sparrow, 5.5 (32, 13); Am. Goldfinch, 5 (29, 12); Prairie Warbler, 4 (23, 9); Gray Catbird, 3.5 (21, 8); White-eyed Vireo, 3.5; Red-winged Blackbird, 3.5; Cardinal, 3.5; Henslows Sparrow, 3.5; Bobwhite, 3 (18, 7); Brown Thrasher, 3; Mourning Dove, 2; Willow Flycatcher, 2; Yellow Warbler, 2; Black-billed Cuckoo, 1.5; Rufous-sided Towhee, 1.5; Grasshopper Sparrow, 1.5; Am. Woodcock, 1; Yellow-billed Cuckoo, 1; Ruby-throated Hummingbird, 1 (female); E. Kingbird, 1; Mockingbird, 1; Blue-gray Gnatcatcher, 1; Brown-headed Cowbird, 1; (female); N. Oriole, 1; Com. Flicker, 0.5; Summer Tanager, 0.5; E. Meadowlark, 0.5; Great Crested Flycatcher, +. **Total:** 32 species; 106.5 territorial males (625/km^2, 253/100 acres). Paul Carmony, Robert Mindick, and Juanita R. Webster helped with the census work, but their time was not calculated above. — *J. DAN WEBSTER, Hanover College, Hanover, Ind. 47243.*

84. SUBURBAN CEMETERY. — **Location:** Indiana; Wayne Co., Earlham Cemetery, along Route 40 W on the W edge of Richmond; 39°49'20"N, 84°55'W, Richmond Quadrangle, USGS. **Continuity:** New. **Size:** 5.87 ha = 14.5 acres (roughly rectangular, measured from map aided by several field measurements). **Description of Plot:** Established as a cemetery in 1862; contains 2 small dwellings and a paved loop road. **Vegetation:** Composed primarily of mature Norway Maple (*Acer platanoides*) and Norway Spruce (*Picea abies*). Mowed lawn is the most prominent grond cover. A quantitative survey of vegetation yielded the following results: Trees, 3-in. or more in diameter, from seven 0.1-acre circular samples, 29/acre; total basal area 34.4 ft^2/acre. Species comprising 90% of the total number of trees: Hackberry (*Celtis occidentalis*), 10, 33, 6, 8; Norway Spruce, 6, 19, 13, 17; Norway Maple, 4, 14, 45, 25; Arbor Vitae (*Thuja occidentalis*), 3, 10, 2, 17; White Mulberry (*Morus alba*), 3, 10, 2, 8; Tulip-tree (*Liriodendron tulipfera*), 1, 5, 29, 8. Trees by diameter size class: A (3-6 in.) 8, 29, 0, 8, 2; B (6-9 in.) 8, 29, 2, 5, 7; C (9-15 in.) 7, 24, 5, 6, 16; E (21-27 in.) 3, 10, 8, 7, 25; F (27-33 in.) 1, 5, 6, 9, 20; G (33-40 in.) 1, 5, 9, 9, 29. Shrub stems/acre 1143; ground cover 91%; pavement 8%; canopy cover 44%; average canopy height 58 ft (range 15-90). **Edge:** N bordered by highway, E by a dense row of trees and shrubs with grass lawns beyond, SW by a stream gully of second-growth deciduous forest, NW by grass lawn. **Topography:** Level to gradual slope, mostly W-facing. **Elevation:** 960 ft. **Weather:** Temperatures normal, precipitation below normal in contrast to a generally late, wet spring. **Coverage:** May 26-31; June 1-2; 0500-0630 or 1900-2030 hours. Total man-hours: 32. **Census:** Am. Robin, 15 (256, 103); Cardinal, 13 (222, 90); Mourning Dove, 8 (136, 55); Chipping Sparrow, 6 (102, 41); E. Wood Pewee, 3 (51, 21); Com. Flicker, 2; Blue Jay, 2; Gray Catbird, 2; Starling, 2; Red-eyed Vireo, 2; Song Sparrow, 2; Red-bellied Woodpecker, 1; Carolina Chickadee, 1; Tufted Titmouse, 1; Indigo Bunting, 1; E. Bluebird, 1; Com. Grackle, 1; Brown-headed Cowbird, 0.5. **Total:** 18 species; 63.5 territorial males or females (1082/km^2, 438/100 acres). **Remarks:** Goldfinches and grackles from an adjacent, uncensused area were observed feeding in the plot. Special thanks to W. H. Buskirk for assistance. — *RICK BUSING, TRESSA CATHCART, EDMUND WICKERSHAM and BOB CUCINOTTA, Biology Dept., Earlham College, Richmond, Ind. 47374.*

85. DECIDUOUS CLEARCUT. — **Location:** Tennessee; Washington Co., Horse Cove Gap; about 4.5 mi S of Johnson City; 36°14'N, 82°22'W, Erwin Quadrangle, USGS. **Continuity:** Established 1975; 4 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29:1117-8 (1975). **Weather:** Clear. **Coverage:** May 20-21, 27-30; June 3-4; 0600-0830. Total man-hours: 12. **Census:** Rufous-sided Towhee, 11 (54, 22); Yellow-breasted Chat, 10 (49, 20); White-eyed Vireo, 7 (35, 14); Hooded Warbler, 7; Indigo Bunting, 7; Ruby-throated Hummingbird, 5 (25, 10); Chestnut-sided Warbler, 5; Kentucky Warbler, 4 (20, 8); Blue-gray Gnatcatcher, 1; Red-eyed Vireo, 1; Black-and-white Warbler, 1; Brown-headed Cowbird, (female) 1; Cardinal, 1. **Total:** 13 species; 61 territorial males or females (301/km^2, 122/100 acres). **Remarks:** Total density highest yet, 61 territories this year compared to 53 in 1977, 32 in 1976, 33 in 1975. Six species had increases of 3 or more territories over last year: Ruby-throated Hummingbird (1 to 5), White-eyed Vireo (4 to 7), Chestnut-sided Warbler (1 to 5), Yellow-breasted Chat (6 to 10), Hooded Warbler (4 to 7) and Rufous-sided Towhee (8 to 11). No Carolina Wrens were observed this year. — *RICHARD P. LEWIS, Rt. 2, Box 435, Johnson City, Tenn. 37601.*



86. DECIDUOUS FOREST AND CONTOUR STRIP MINE. — **Location:** Tennessee: Campbell Co., on SE slope of Walnut Mountain, 3.1 mi NW of La Follette; 36°24'30"N, 84°09'53"W; Ivydell Quadrangle. **Continuity:** New. **Size:** 23.4 ha = 57.8 acre; mined area is 10.5 ha = 25.9 acre (measured with planimeter and aerial photograph). **Description of Plot:** Includes an area mined approximately 12 years ago and a forested area immediately uphill of the mine. The mine extends approximately NW-SW along the 2100 ft contour for 1.2 km and varies in width from 60-160 m. The mined area consists of a farily level bench, separating highwall and outslope areas. The highwall, almost vertical in many places, is up to 20 m tall with many rock outcrops. The outslope is up to 95 m wide, with a maximum vertical drop of 30 m. Many eroded gullies occur and erosion control structures were built in 1977. Erosion of both the highwall and outslope is continual. The forested area is steep and xeric on southern exposures. A small stream crosses near the S end and two ponds occur along the base of the highwall. A gravel road, with light truck traffic, crosses the mine lengthwise. The outslope and highwall are mostly devoid of vegetation, and clumps of trees and shrubs occur on the bench area. Tree density is 116 3-6 in. dbh trees per ha (47/acre) and 27 6-9 in. trees per ha (11/acre) on the bench and outslope. In decending order of frequency, these are Shortleaf Pine (*Pinus echinata*), Virginia Pine (*P. virginianum*), Black Locust (*Robinia pseudoacacia*), Tulip-tree (*Liriodendron tulipifera*), Black Willow (*Salix nigra*), and Red Maple (*Acer rubrum*). Shrub density, mostly *Rubus*, pines, locust, and Pokeweed (*Phytolacca americana*), was 2255 stems/acre. Canopy closure on bench and outslope areas was 26%; canopy height 16 ft. Ground cover, mostly grasses, *Smilax*, and various asters, was 38%. A quantitative survey of the vegetation of the forested area gave: Trees 3-in. and over, 298/acre, total basal area, 98.6 ft^2/acre. Species comprising 90% of the total number of trees: Red Maple, 49, 16, 8, 80; Hickory (*Carya* spp.), 45, 15, 39, 100; Chestnut Oak (*Quercus prinus*), 45, 15, 12, 60; N. Red Oak (*Q. rubra*), 39, 13, 3, 40; Black Oak (*Q. velutina*), 23, 8, 8, 80; Black Gum (*Nyssa sylvatica*), 19, 7, 5, 80; Black Locust, 16, 5, 4, 80; Flowering Dogwood (*Cornus florida*), 16, 5, 3, 60; Sourwood (*Oxydendrum arboreum*), 13, 4, 1, 40; Shortleaf Pine, 10, 3, 2, 20. Trees by diameter size class: A (3-6 in.) 181, 61, 20, 20; B (6-9 in.) 62, 21, 18.9, 19; C (9-15 in.) 32, 11, 25.4, 26; D (15-21 in.) 23, 8, 35.3, 35. Remaining tree species include White Oak (*Q. alba*), Tulip-tree, Black Walnut (*Juglans nigra*), Virginia Pine, and White Ash (*Fraxinus americanus*). Shrub stems averaged 15,682/acre; ground cover, 27%; canopy cover, 90%; average canopy-height 37 ft (range 18-60 ft). **Edge:** Bordered by similar forest on 3 sides, and by similar strip mine to the S. **Topography:** Elevation, 2000-2280 ft; surrounding area is mountainous. **Weather:** Mid-day cool and wet; otherwise warm and dry, occasional early morning fog; temperature during censuses 55-88°F. **Coverage:** Apr. 27; May 1, 15, 23; June 7, 9, 14, 27; 0625-1110 and 1900-2230, EDT. Total man-hours: 15. **Census:** Red-eyed Vireo, 7 (30, 12); Indigo Bunting, 7; Ovenbird 6.5 (28, 11); Black-and-white Warbler, 6 (26, 10); Rufous-sided Towhee, 6; Worm-eating

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Brown Thrasher. Bobolink. and Red-winged Blackbird; Brown Thrasher and Downy Woodpecker were seen feeding young and Bobolink and Red-winged Blackbird carrying food. Two of the Yellow Warbler nests were parasitized by Brown-headed Cowbirds. Gratitude is extended to the staff of the Wye Marsh Wildlife Interpretation Centre and Bufo Inc. for their assistance. A special thanks to Robert Whittam and Harold J. Parsons for their advice. — *MICHAEL A. ELLIOT. CHRISTOPHER G. HARRIS. 11 Letitia Street. Barrie. Ontario. Canada L4N 1N7.*

81. DISTURBED OAK-HICKORY FOREST. PINE STAND. EDGE. AND POND. — Location: Ohio; Licking Co., Eden Township. Camp Falling Rock. 1.2 mi NNE of the intersection of County Road 210 and State Route 79: 40°11'N. 82°18.5'W. Newark Quadrangle. USGS. **Continuity:** Established 1937: 41 intermittent years. **Size:** 14.16 ha = about 35 acres. **Description of Plot:** See *Bird-Lore* 39:379-380 (1937). Habitat changes: Loss of several large-diameter trees. from windfall and cutting in the small stream valley. **Weather:** No unusual patterns. **Coverage:** June 2. 5; Aug. 24. Total man-hours: 20. **Census:** Acadian Flycatcher. 8 (56. 23); Red-eyed Vireo. 8; Wood Thrush. 7 (49. 20); Am. Robin. 5 (35. 14); Scarlet Tanager. 5; Cerulean Warbler. 4 (28. 11); E. Wood Pewee. 3 (21. 9); House Wren. 3; Gray Catbird. 3; Kentucky Warbler. 3; Cardinal. 3; Mourning Dove. 2; Red-bellied Woodpecker. 2; Downy Woodpecker. 2; Great Crested Flycatcher. 2; Tufted Titmouse. 2; White-breasted Nuthatch. 2; Yellow-throated Vireo. 2; Ovenbird. 2; Brown-headed Cowbird. 2; Chipping Sparrow. 2; Yellow-billed Cuckoo. 1; Screech Owl. 1; Ruby-throated Hummingbird. 1; Hairy Woodpecker. 1; E. Phoebe. 1; Blue Jay. 1; Carolina Chickadee. 1; Blue-gray Gnatcatcher. 1; Cedar Waxwing. 1; Warbling Vireo. 1; Louisiana Waterthrush. 1; Am. Redstart. 1; N. Oriole. 1; Rose-breasted Grosbeak. 1; Indigo Bunting. 1; Am. Goldfinch. 1; Song Sparrow. 1. **Total:** 38 species; 89 territorial males (females). 628/km^2. 254/100 acres). **Remarks:** The most mature and productive area. in the E end of the small stream valley. suffered its second significant disturbance by the loss of two oaks by cutting and Red Elm by windfall. In removing the timber. caterpillar tractor damage to ground cover and understory. in addition to what was downed by the trees. was added. Owing to reduced coverage because of travel restrictions. this year's census is not typical of previous ones. Time was available for the discovery of only 16 nests (average about 34). The number of species and pairs remained relatively unchanged. The presence of the Hooded Warbler could not be verified as a summer resident. No evidence of cowbird parasitism was obtained. Corrigendum: In *AB* 31(1):60. under total. change 3.6/km. 3.5/mi to 14.8 pairs/km. 23.7 pairs/mi. — *A. H. CLAUGUS. 228 S. Lake St., Carey. Ohio 43316.*

82. SUBURBAN CEMETERY. — Location: Indiana; Wayne Co., Earlham Cemetery. along Route 40 W on the W edge of Richmond: 39°49'20"N. 84°55'W. Richmond Quadrangle. USGS. **Continuity:** Established 1978. **Size:** 5.87 ha = 14.5 acres. **Description of Plot:** See *AB* 33:78 (1979). **Weather:** Clear to partly cloudy; no precipitation during counts; early morning fog once: temperatures normal. **Coverage:** May 28-31: June 1-4; 0500-0630 or 1900-2030 hours. Total man-hours: 24. **Census:** Am. Robin. 12 (204. 83); Starling. 10 (170. 69); Cardinal. 5 (85. 34); Chipping Sparrow. 4 (68. 28); E. Wood Pewee. 3 (51. 21); Brown-headed Cowbird. 2.5; Mourning Dove. 2; Purple Martin. 2; Red-eyed Vireo. 2; Ruby-throated Hummingbird. 1; Com. Flicker. 1; Red-headed Woodpecker. 1; Blue Jay. 1; Carolina Chickadee. 1; Tufted Titmouse. 1; White-breasted Nuthatch. 1; House Wren. 1; Gray Catbird. 1; Indigo Bunting. 1; Song Sparrow. 1. **Total:** 20 species; 53.5 territorial males or females (912/km^2. 369 /100 acres). **Visitors:** Com. Crow. Com. Grackle. Am. Goldfinch. **Remarks:** Total density lower this year. 53.5 territories compared to 63.5. Three species had decreases of 3 or more territories: Am. Robin (15 to 12). Cardinal (13 to 5). Mourning Dove. (8 to 2). Starling had an increase from 2 to 10. Special thanks to W. H. Buskirk for assistance. — *SHEILA CUMMINS. DAVE McCONNELL. CINDY MANNING. and MARILYN MARSHALL. Biology Dept., Earlham College. Richmond. Ind. 47374.*

83. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., Horse Cove Gap; about 4.5 mi S of Johnson City; 36°14'N. 82°22'W. Erwin Quadrangle. USGS. **Continuity:** Established 1975; 5 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29:1117-8 (1975). **Weather:** A wet spring. **Coverage:** May 19-21. 23. 25. 28. 30; June 6. 25; 0600-0900 and 1700-1900. Total man-hours: 16. **Census:** Rufous-sided Towhee. 14 (69. 28); Yellow-breasted Chat. 10 (49. 20); Indigo Bunting. 10; Hooded Warbler. 7.5 (37. 15); White-eyed Vireo. 6 (30. 12); Kentucky Warbler. 6; Ruby-throated Hummingbird. 5 (25. 10); Red-eyed Vireo. 5; Cardinal. 4 (20. 8); Am. Goldfinch. 3 (15. 6); Blue-gray Gnatcatcher. 2; Black-and-white Warbler. 2; Carolina Chickadee. 1; Gray Catbird. 1; N. Parula. 1; Com. Yellowthroat. 1; Brown-headed Cowbird. (female) 1; Pileated Woodpecker. +; Downy Woodpecker. +. **Total:** 19 species; 79.5 territorial males or females (393/km^2. 159/100 acres). **Remarks:** Observed feeding young: Blue-gray Gnatcatcher and Yellow-breasted Chat. Total density continues to increase. Total species up this year. also. Six new territorial species this year: Pileated Woodpecker. Carolina Chickadee. Gray Catbird. N. Parula. Com. Yellowthroat. and Am. Goldfinch. Species showing greatest increase was the Red-eyed Vireo (5 this year compared to 1 last year). Species showing greatest decrease was the Chestnut-sided Warbler (none this year as opposed to 5 last year). — *RICHARD P. LEWIS. Rt. 3. Box 5. Bristol. Tenn. 37620.*

84. DECIDUOUS FOREST AND CONTOUR STRIP MINE. — Location: Tennessee; Campbell Co., on SE slope of Walnut Mountain. 3.1 mi NW of LaFollette; 36°24'30"N. 84°09'53"W; Ivydell Quadrangle. **Continuity:** Established 1978. **Size:** 23.4 ha = 57.8 acres. **Description of Plot:** See *AB* 33:78-79 (1979). Bulldozing and exploratory core drilling disturbed about 5% of the bench area this spring. Several of these cleared areas held water throughout the census. **Weather:** May and June normal; July cool and much wetter than normal. Temperature 45-80°F. **Coverage:** May 14. 19; June 7. 14. 19. 22; 0615-0945. EDT. Total man-hours: 16.5. **Census:** Indigo Bunting. 9.5 (41. 16); Ovenbird. 8 (34. 14); Red-eyed Vireo. 7.5 (32. 13); Black-and-white Warbler. 7 (30. 12); Worm-eating Warbler. 6.5 (28. 11); Rufous-sided Towhee. 5.5 (24. 10); Hooded Warbler. 4.5 (19. 8); Cerulean Warbler. 4 (17. 7); Scarlet Tanager. 4; Wood Thrush. 3 (13. 5); Kentucky Warbler. 2.5; Yellow-billed Cuckoo. 2; Carolina Chickadee. 2; Tufted Titmouse. 2; Blue-gray Gnatcatcher. 2; Golden-winged Warbler. 2; Chestnut-sided Warbler. 2; Am. Redstart. 2; Summer Tanager. 2; E. Phoebe. 1.5; Brown-headed Cowbird (female). 1.5; Am. Goldfinch. 1.5; Downy Woodpecker. 1; Acadian Flycatcher. 1; Rough-winged Swallow. 1; Blue Jay. 1; Com. Crow. 1; White-breasted Nuthatch. 1; Yellow-throated Vireo. 1; Cardinal. 1; Field Sparrow. 1; Pileated Woodpecker. 0.5; E. Wood Pewee. 0.5; Red-bellied Woodpecker. +; Great Crested Flycatcher. +. **Total:** 35 species; 92.5 territorial males or females (395/km^2. 160/100 acres). **Visitors:** Red-tailed Hawk. Hairy Woodpecker. Solitary Vireo. Yellow-throated Warbler. Red-winged Blackbird. **Remarks:** Nests found: E. Phoebe. Wood Thrush. Cardinal. Field Sparrow. 1 each. Fledglings noted: Downy Woodpecker. Red-eyed Vireo. Black-and-white Warbler. Worm-eating Warbler. Golden-winged Warbler. Am. Redstart. In early August the forested area was cleared and coal strip-mining begun immediately upslope of the existing mine bench. This study was funded by an orphan mine reclamation project coordinated by the Tennessee Valley Authority. — *CHARLES P. NICHOLSON. P.O. Box 402. Norris. Tenn. 37828.*

85. MIXED - MESOPHYTIC WOODS. FIELDS. AND BRUSH. — Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey. in Barnes Hollow to NW of Lee Knob: 36°9'45"N. 85°22'W. Monterey Quadrangle. USGS. **Continuity:** Established 1978 (1977 open portions); 3 consecutive years. **Size:** 30 ha = 74 acres. **Description of Plot:** See *AB* 32:80 (1978) and 33:79 (1979). Changes: House built. The ⅓ acre field planted to sweet corn. millet. sorghum. beans. and sunflowers (last two destroyed by rabbits); some of rye harvested by June; quite weedy in July. **Weather:** Cooler than normal; late frosts Apr. 29 and May 26. Bad flooding May 3-5. some flooding in the very wet July; June and August mostly dry. **Coverage:** Apr. 17-18. 20. 22. 28-29; May 1-3. 6-10. 14-15. 18. 26-27. 30; June 1-2. 6. 8. 19; 0500-2030 hours. CDT. Total man-hours: over 51. **Census:** Red-eyed Vireo. 22.5 (75. 30); Blue-gray Gnatcatcher. 6.5 (22. 9); Indigo Bunting. 6.5; Prairie Warbler. 5.5 (18. 7); White-eyed Vireo. 5 (17. 7); Yellow-breasted Chat. 5; Cardinal. 4 (13. 5); Field Sparrow. 4; Acadian Flycatcher. 3.5 (12. 5); Rufous-sided Towhee. 3.5; Kentucky Warbler. 3 (10. 4); Yellow-billed Cuckoo. 2; Carolina Chickadee. 2; Yellow-throated Vireo. 2; Summer Tanager. 2; Wood Thrush. 1.5; Hooded Warbler. 1.5; Scarlet Tanager. 1.5; Whip-poor-will. 1; Ruby-throated Hummingbird. 1; Downy Woodpecker. 1; E. Phoebe. 1; Blue Jay. 1; Tufted Titmouse. 1; White-breasted Nuthatch. 1; Worm-eating Warbler. 1; Ovenbird. 1; Com. Yellowthroat. 1; Brown-headed Cowbird. 1;

From: AB 35(1):76;1981

105. DISTURBED OAK - HICKORY FOREST, PINE STAND, EDGE, AND POND.—**Location:** Ohio; Licking Co., Eden Township, Camp Falling Rock, 1.2 mi NNE of the intersection of County Road 210 and State Route 79; 40°11'N, 82°18.5'W, Newark Quadrangle, USGS. **Continuity:** Established 1937; 42 intermittent years. **Size:** 14.16 ha = about 35 acres. **Description of Plot:** See *Bird-Lore* 39:379-80 (1937). **Habitat Changes:** More than a normal loss of trees took place. Eight species of wind-blown trees and one which was cut were lost, ranging from 3 in. White Oak (*Quercus alba*) to a 4 ft. Tulip-tree (*Liriodendron tulipifera*). **Weather:** The severe spring storms which caused the windfall of trees damaged some early nests, such as the robin's and might have caused other disturbances in the nesting cycles. **Coverage:** June 7, 11. **Total hours:** 14. **Census:** Red-eyed Vireo, 8 (56, 23); Acadian Flycatcher, 7 (49, 20); Wood Thrush, 6 (42, 17); Am. Robin, 5 (35, 14); Scarlet Tanager, 5; Cerulean Warbler, 4 (28, 11); E. Wood Pewee, 3 (21, 9); House Wren, 3; Gray Catbird, 3; Kentucky Warbler, 3; Cardinal, 3; Red-bellied Woodpecker, 2; Downy Woodpecker, 2; Great Crested Flycatcher, 2; Tufted Titmouse, 2; White-breasted Nuthatch, 2; Yellow-throated Vireo, 2; Ovenbird, 2; Brown-headed Cowbird, 2; Chipping Sparrow, 2; Mourning Dove, 1; Yellow-billed Cuckoo, 1; Ruby-throated Hummingbird, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; E. Phoebe, 1; Blue Jay, 1; Com. Crow, 1; Carolina Chickadee, 1; Blue-gray Gnatcatcher, 1; Cedar Waxwing, 1; Warbling Vireo, 1; Louisiana Waterthrush, 1; Am. Redstart, 1; N. Oriole, 1; Rose-breasted Grosbeak, 1; Indigo Bunting, 1; Am. Goldfinch, 1; Song Sparrow, 1. **Total:** 39 species; 87 pairs, (614/km^2, 249/100 acres). The reduced man-hours of this census makes it less reliable than those prior to 1979.—*A.H. CLAUGUS, 228 S. Lake St., Carey, Ohio 43316.*

106. DECIDUOUS CLEARCUT (6 yr).—**Location:** Tennessee; Washington Co., Horse Cove Gap; about 4.5 mi S of Johnson City; 36°14'N, 82°22'W, Erwin Quadrangle, USGS. **Continuity:** Established 1975; 6 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29:1117-8 (1975). Tree regrowth now averages about 12 ft high. **Weather:** Clear, very dry. **Coverage:** May 24-26, 31; June 1, 3-4, 8, 28; July 26; Aug. 16; 0530-1100, EDT. **Total hours:** 31. **Census:** Rufous-sided Towhee, 26 (128, 52); Yellow-breasted Chat, 16 (79, 32); Hooded Warbler, 13.5 (67, 27); Ruby-throated Hummingbird, 6 (30, 12); White-eyed Vireo, 6; Kentucky Warbler, 4 (20, 8); Cardinal, 4; Red-eyed Vireo, 3 (15, 6); Indigo Bunting, 3; Carolina Chickadee, 2; Am. Goldfinch, 2; Whip-poor-will, 1; Gray Catbird, 1; Blue-gray Gnatcatcher, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1; Sharp-shinned Hawk, +; Pileated Woodpecker, +; Downy Woodpecker, +; Yellow-throated Vireo, +; Black-and-white Warbler, +. **Total:** 21 species; 90.5 territorial males or females (447/km^2, 181/100 acres). **Remarks:** Total males for the last 6 years (33, 32, 53, 61, 79.5, 90.5) show how rapidly breeding populations are changing in this changing habitat. Four new species this year: Sharp-shinned Hawk, Whip-poor-will, Yellow-throated Vireo, and Worm-eating Warbler. A species showing a remarkable increase this year was the Rufous-sided Towhee (14 to 26) after a previous 5-year average of 9.2. Other notable increases include Hooded Warbler (7.5 to 13.5) and Yellow-breasted Chat (10 to 16). The Indigo Bunting population crashed this year (10 to 3) after a previous 5-year average of 9.6. A visiting Carolina Wren seen in July was the first observed since 1976 when this species had 5 territories. The nest of the Sharp-shinned Hawk was not found but was believed to have been just beyond the middle of the SE border. This hawk was heard calling from and seen going to the spot throughout the census. On July 26, two immatures were observed near the presumed nesting spot while two adults flew overhead.—*RICHARD LEWIS, Rt. 3, Box 5, Bristol, Tenn. 37620.*

107. DECIDUOUS CLEARCUT (2-yr.).—**Location:** Tennessee; Sullivan Co., Dogwood Bench; about 17 mi E of Bristol on Hwy 421; 32°30'N, 82°58'N, Shady Valley Quadrangle, USGS. **Continuity:** New. **Size:** 8.1 ha = 20 acres. **Description of Plot:** The area appears to have been clear cut in 1978. Except for about 20 scattered trees in the S corner, there are no standing trees on the plot. A dirt road forms the SE border. Vegetation consists mainly of stump sprouts. Shrub stems per acre, 27,140; ground cover 64%; estimated average shrub height 3 ft. Relative densities of stump sprouts and seedlings: Red Maple (*Acer rubrum*), 25%; *Sassafras albidum*, 25%; Sourwood (*Oxydendrum arboreum*), 15%; Am. Chestnut (*Castanea dentata*), 15%; Chestnut Oak (*Quercus prinus*), 10%. The main shrubs are Mountain Laurel (*Kalmia latifolia*) and Rosebay Rhododendron (*Rhododendron catawbiense*). **Edge:** Surrounded by mature hardwood forest. **Topography:** On the SE slope of a ridge. **Elevation:** 2800 ft. **Weather:** Clear, dry. **Coverage:** May 29-30; June 12, 14-15, 21; July 19; Aug. 9; 0540-0900. **Total hours:** 12. **Census:** Rufous-sided Towhee, 11 (136, 55); Indigo Bunting, 4 (49, 20); Gray Catbird, 1; Worm-eating Warbler, 1. **Total:** 4 species; 17 territorial males (210/km^2, 85/100 acres).—*RICHARD LEWIS, Rt. 3, Box 5, Bristol, Tenn. 37620.*

108. MIXED-MESOPHYTIC WOODS, FIELDS, AND BRUSH.—**Location:** Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob; 36°9'45"N, 85°22'W, Monterey Quadrangle, USGS. **Continuity:** Established 1977; 4 consecutive years. **Size:** 30 ha = 74 acres. **Description of Plot:** See *AB* 32:80 (1978) and 33:79 (1979). **Changes:** Lumbering from March to May affected about 10 ha N of plot and about 25 ha (or more) E of plot; bulldozing in April and May along the bottomland dirt road did some damage to adjacent vegetation; lumbering only immediately adjacent to NE border. In addition, about 20 trees over 6 in. dbh were cut. Weeds occupied most of the field cultivated in 1979. **Weather:** Drier than normal; summer hotter than normal, with drought conditions by mid-July that killed or injured many saplings, especially Tulip-trees (*Liriodendron*). Rain in late July eased the drought. Temperature extremes 0-39°C for the season; 5-25° during census. **Coverage:** Apr. 17, 20, 22, 24; May 1, 3-4, 11, 15, 21, 24, 26; June 1, 5, 7, 14-15, 22, 23; 0500-2030 hours, CDT. **Total hours:** 38+. **Census:** Red-eyed Vireo, 17 (57, 23); Prairie Warbler, 6.5 (22, 9); Yellow-breasted Chat, 6 (20, 8); Indigo Bunting, 5.5 (18, 7); Blue-gray Gnatcatcher, 5 (17, 7); White-eyed Vireo, 5; Field Sparrow, 5; Com. Yellowthroat, 4 (13, 5); Cardinal, 4; Acadian Flycatcher, 3 (10, 4); Rufous-sided Towhee, 3; Yellow-throated Vireo, 2.5; Yellow-billed Cuckoo, 2; Tufted Titmouse, 2; Wood Thrush, 2; Kentucky Warbler, 2; E. Phoebe, 1.5; Carolina Chickadee, 1.5; Cerulean Warbler, 1.5; Ovenbird, 1.5; Hooded Warbler, 1.5; Whip-poor-will, 1; Ruby-throated Hummingbird, 1; Downy Woodpecker, 1; Blue Jay, 1; White-breasted Nuthatch, 1; Black-and-white Warbler, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1+; Scarlet Tanager, 1; Summer Tanager, 1+; Broad-winged Hawk, 0.5; Mourning Dove, 0.5; Screech Owl, 0.5; Pileated Woodpecker, 0.5; Red-bellied Woodpecker, 0.5; Hairy Woodpecker, 0.5; Blue Grosbeak, 0.5; Am. Goldfinch, 0.5; Bobwhite, +; E. Wood Pewee, +. **Total:** 41 species; 96 territorial males or females (321/km^2, 130/100 acres). **Visitors:** Turkey Vulture, Red-tailed Hawk, Chimney Swift, Barn Swallow, Purple Martin, Com. Crow, Gray Catbird, Brown Thrasher, Blue-winged Warbler, Red-winged Blackbird, Chipping Sparrow. **Remarks:** Active nests located: E. Phoebe, (1), Blue-gray Gnatcatcher (1). Declines in species such as Acadian Flycatcher, Blue-gray Gnatcatcher, Red-eyed Vireo, Kentucky Warbler, and Indigo Bunting so far appear balanced by gains in other species as Prairie Warbler, Com. Yellowthroat, Yellow-breasted Chat and Field Sparrow. The nearby lumbering may have affected Black-and-white and Cerulean warblers, which were known to occur E of the plot in years past; these species appear territorial but probably did not breed.—*RICHARD W. SIMMERS, JR., Route 6, Box 170, Cookeville, Tenn. 38501.*

109. DECIDUOUS CLEARCUT.—**Location:** Georgia; Rabun Co., Chattahoochee Nat'l Forest, 5 mi SE of Clayton; 34°48'N, 83°24'W, Tiger Quadrangle, USGS. **Continuity:** Established 1977; 4 consecutive years. **Size:** 6.88 ha = 17 acres. **Description of Plot:** See *AB* 32:80-1 (1978). **Weather:** Sunny and cool. **Coverage:** May 5-8, 11, 19, 26; 0700-1000. **Total hours:** 10. **Census:** Rufous-sided Towhee, 16 (233, 94); Indigo Bunting, 3 (44, 18); Prairie Warbler, 3; Carolina Chickadee, 1; Carolina Wren, 1; Brown Thrasher, 1; Yellow-breasted Chat, 1; Cardinal, 1; Chipping Sparrow, 1. **Total:** 9 species; 28 territorial males (407/km^2, 165/100 acres). **Visitors:** Great Crested Flycatcher, E. Phoebe, Blue-gray Gnatcatcher, Red-eyed Vireo, Hooded Warbler, Pine Warbler, Scarlet Tanager, Am. Goldfinch. **Nest found:** Rufous-sided Towhee.—*LOUIS W. SCHWEIZER, 2573 Tilson Dr. SE, Atlanta, Ga. 30317.*

110. IMPROVED PASTURE AND OAK-PINE FOREST.—**Location:** Oklahoma; Delaware Co., 3.5 mi S of Jay; 36°22'N, 94°48'W, Jay Quadrangle, USGS. **Continuity:** Established 1979. **Size:** 9.11 ha = 22.5 acres. **Description of Plot:** See *AB* 34:70-71 (1980). **Weather:** See Census 54. **Coverage:** May 3, 6, 13; June 14, 16, 28; July 5;

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($756/km^2$, 306/100 acres). **Visitors:** Black-billed Cuckoo, Chestnut-sided Warbler, Ovenbird. **Remarks:** Nest located: Downy Woodpecker: fledglings noted: Blue Jay.—*BOB ADAMS, VERN AUNE (compiler), S 13 W 22167 Ridge Rd, Waukesha, WI 53186.*

102. DISTURBED OAK–HICKORY FOREST, PINE STAND, EDGE, AND POND. — Location: Ohio: Licking Co., Eden Township, Camp Falling Rock, 1.2 mi NNE of the intersection of County Rd 210 and St. Rt 79: 40°11'N, 82°18.5'W, Newark Quadrangle, USGS. **Continuity:** Established 1937; 43 intermittent years. **Size:** 14.16 ha = about 35 acres. **Description of Plot:** See *Bird-Lore* 39: 379-80 (1937). **Weather:** Severe rainstorms in early June caused nest destruction and delay of some first broods. **Coverage:** May 28; June 6, 23; Aug. 30. Total man-hours: 20. **Census:** Red-eyed Vireo, 8 (56, 23); Acadian Flycatcher, 6 (42, 17); Wood Thrush, 6; Am. Robin, 5 (35, 14); Scarlet Tanager, 5; E. Wood Pewee, 4 (28, 11); Cerulean Warbler, 4; House Wren, 3 (21, 9); Gray Catbird, 3; Cardinal, 3; Red-bellied Woodpecker, 2; Downy Woodpecker, 2; Great Crested Flycatcher, 2; Tufted Titmouse, 2; White-breasted Nuthatch, 2; Yellow-throated Vireo, 2; Ovenbird, 2; Kentucky Warbler, 2; Mourning Dove, 1; Yellow-billed Cuckoo, 1; Ruby-throated Hummingbird, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; E. Phoebe, 1; Blue Jay, 1; Carolina Chickadee, 1; Blue-gray Gnatcatcher, 1; Cedar Waxwing, 1; Warbling Vireo, 1; Louisiana Waterthrush, 1; N. Oriole, 1; Brown-headed Cowbird, 1; Rose-breasted Grosbeak, 1; Indigo Bunting, 1; Am. Goldfinch, 1; Chipping Sparrow, 1; Song Sparrow, 1. **Total:** 37 species; 82 pairs ($579 km^2$, 234/100 acres). **Remarks:** Approximate average density and slightly higher species richness characterize this year's census. Ten nests were located, a much lower number than might be expected from the field-hours devoted. Cowbird activity was low and other factors seemed to be normal.—*A.H. CLAUGUS, 228 S. Lake St, Carey, OH 43316.*

103. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., Horse Cove Gap, about 4.5 mi S of Johnson City; 36°14'N, 82°22'W, Erwin Quadrangle, USGS. **Continuity:** Established 1975; 7 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29: 1117-8 (1975). **Weather:** Fairly wet during census. **Coverage:** May 30; June 4-6, 8, 11, 13-14, 27; 0545-1200. Total man-hours: 24. **Census:** Rufous-sided Towhee, 27 (133, 54); Hooded Warbler, 14 (69, 28); Yellow-breasted Chat, 11(54, 22); Ruby-throated Hummingbird, 5 (25, 10); White-eyed Vireo, 5; Cardinal, 5; Red-eyed Vireo, 4 (20, 8); Swainson's Warbler, 4; Kentucky Warbler, 3 (15, 6); Indigo Bunting, 3; Carolina Wren, 2; Black-and-white Warbler, 2; Am. Goldfinch, 2; Carolina Chickadee, 1; Blue-gray Gnatcatcher, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1; Whip-poor-will, +; Yellow-billed Cuckoo, +; Pileated Woodpecker, +; Black-throated Green Warbler, +. **Total:** 21 species; 91 territorial males or females ($450/km^2$, 182/100 acres). **Remarks:** Nest found: Rufous-sided Towhee. New breeding species for the study: Yellow-billed Cuckoo, Swainson's Warbler, and Black-throated Green Warbler. The most noteworthy species of this year's census were the Carolina Wren (first territories since 1976) and the Swainson's Warbler. The Swainson's Warbler is an uncommon, localized breeder in our area, preferring rhododendron thickets by streams. There were at least 6 territories of this species on or near the plot. Most were not in areas that would be considered optimum habitat. Possibly the wet spring had something to do with their sudden occurrence.—*RICHARD LEWIS, Rt. 3 Box 470, Bristol, TN 37620.*

104. DISTURBED MIXED–MESOPHYTIC WOODLAND RAVINE. — Location: Tennessee: Jackson Co., N end of Wash Morgan Hollow, about 1 2/3 mi N of Dodson Branch: 36°20'N, 85°32'W, Dodson Branch Quadrangle, USGS. **Continuity:** New. **Size:** 7.9 ha = 19.51 acres (rectangular, 1700 × 500 ft, measured with steel tape). **Description of Plot:** A "hollow" covered with mixed hardwoods, plus a few Red Cedars *(Juniperus virginiana)* in the N half; disturbed about 1975 by logging which affected about 12% of the plot. The largest opening is about ½ acre. A few logging roads run through the plot. A stream about 2-4 m wide runs N near the centerline; its flow is permanent in the S half, temporary in the N half. The flattish bottomland is about 15-20 m wide. The dominant canopy trees are Sugar Maple *(Acer saccharum)*, Shagbark Hickory *(Carya ovata)*, White Ash *(Fraxinus americana)*, Yellow Buckeye *(Aesculus octandra)*, Beech *(Fagus grandifolia)* and Chinquapin Oak *(Quercus muehlenbergii)*. Saplings include many Boxelders *(Acer negundo)* in the openings, as well as most of the canopy species. Vines are numerous: wild grape (*Vitis* sp.), Virginia Creeper *(Parthenocissus quinquefolia)*, Crossvine *(Anisostichus capreolata)*, and Poison Ivy *(Rhus radicans)* are all frequent. The most abundant shrubs are Wild Hydrangea *(Hydrangea arborescens)*, Spicebush *(Lindera benzoin)*, Pawpaw *(Asimina triloba)* and Bladdernut *(Staphylea trifolia)*. Cane *(Arundinaria gigantea)* thickets cover about 5% of the plot. The lush ground cover is very rich in species. Trees 3 in. dbh and over, based on ten 0.1 acre circular sample plots, 253/acre; total basal area 75.2 ft^2/acre. Species comprising 93% of the total number of trees: Sugar Maple, 40, 16, 17, 80; dead trees, 29, 11, 7, 90; Shagbark Hickory, 24, 9, 15, 60; White Ash, 20, 8, 8, 80; elms (mostly *Ulmus americana & U. rubra*), 19, 8, 5, 90; Yellow Buckeye, 18, 7, 7, 70; Black Maple *(Acer nigrum)*, 15, 6, 3, 60; Chinquapin Oak, 12, 5, 7, 50; Beech, 11, 4, 7, 50; Hornbeam *(Carpinus caroliniana)*, 10, 4, 2, 20; *Ailanthus altissima*, 8, 3, 2, 20; Bitternut Hickory *(Carya cordiformis)*, 7, 3, 2, 50; Tulip-tree *(Liriodendron tulipifera)*, 5, 2, 4, 30; Hop Hornbeam *(Ostrya virginiana)*, 5, 2, 1, 20; Shumard Oak *(Q. shumardii)*, 4, 2, 4, 40; White Basswood *(Tilia heterophylla)*, 4, 2, 1, 40; Red Mulberry *(Morus rubra)*, 4, 2, 1, 40. Trees by diameter size class: A (3-6 in.) 141, 56, 14.1, 19; B (6-9 in.) 61, 24, 18.3, 24; C (9-15 in.) 49, 19, 39.2 52; D (15-21 in.) 2, 1, 3.6, 5. Ground cover about 70% (summer); canopy cover about 75%; canopy height about 50-70 ft. **Edge:** Similar woods on 3 sides; to N lies open bottomland woods, some weedy fields, and a gravel road (about 100 ft from the N edge). **Topography:** Steep slopes facing E and W mostly. Some outcrops of Ordovician limestone. **Elevation:** 560-780 ft. **Coverage:** Apr. 11, 25; May 2, 16; June 3, 5, 9, 19, 27; 0830-1130, CDT. Total man-hours: over 18. **Census:** Red-eyed Vireo, 15 (190, 77); Acadian Flycatcher, 7 (88, 36); Kentucky Warbler, 6 (76, 31); Wood Thrush, 5 (89, 36); Worm-eating Warbler, 5; N. Parula, 3.5 (44, 18); Hooded Warbler, 3.5; Ruby-throated Hummingbird, 3 (38, 15); Yellow-billed Cuckoo, 2; Louisiana Waterthrush, 2; Scarlet Tanager, 2; Indigo Bunting, 2; Blue-gray Gnatcatcher, 1.5; Cerulean Warbler, 1.5; Cardinal, 1.5; Hairy Woodpecker, 1; Downy Woodpecker, 1; Carolina Chickadee, 1; Carolina Wren, 1; Yellow-throated Vireo, 1; Black-and-white Warbler, 1; Com. Yellowthroat, 1; Red-bellied Woodpecker, 0.5; Tufted Titmouse, 0.5; Ovenbird, 0.5; Summer Tanager, 0.5; Pileated Woodpecker, +; Brown-headed Cowbird, +. **Total:** 28 species; 69.5 territorial males or females ($880/km^2$, 356/100 acres). **Remarks:** Nests seen: hummingbird, 1; Red-eyed Vireo 1. A flood on June 7 did considerable damage to the bottomland; a new channel about 50 ft long was eroded locally. Logs were swept downstream; most low vegetation in the path of the flood was flattened. The Com. Yellowthroat was not found after this event; it was registered at the largest opening. This sheltered hollow did not suffer noticeably from last year's drought. The rich soil, presumably high in phosphate, should affect the density of the bird population, which is considerably greater than that of Census 105. Thanks to Amy Johnson.—*RICHARD W. SIMMERS, JR., Box 170, Rt 6, Cookeville, TN 38501.*

105. MIXED-MESOPHYTIC WOODS, FIELDS, AND BRUSH. — Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob: 36°9'45"N, 85°22'W, Monterey Quadrangle, USGS. **Continuity:** Established 1977; 5 consecutive years. **Size:** 30 ha = 74 acres. **Description of Plot:** See *AB* 32: 80 (1978) and 33: 79 (1979). Changes: Last year's drought apparently caused the death or dieback of a fair number (perhaps 0.5%) of trees, especially Hornbeams *(Carpinus)*; many blackberry (*Rubus* spp.) patches were badly injured also. Tick Trefoils (*Desmodium* spp.), Bush Clovers (*Lespedeza* spp.) and Winged Sumac *(Rhus copallina)* have markedly increased since 1977. Continued growth and succession in much of the field and brush areas has occurred. **Weather:** No late killing frosts; dry at times but no real drought this year. Heavy rains in early June caused minor flooding. Temperatures during trips 37°-93°F (3-34°C). **Coverage:** Apr. 12, 18-19, 22, 27; May 1, 3, 6, 13, 21-22, 24, 29; June 4-5, 14, 17, 21, 28; 0446-1150. Total man-hours: 45. **Census:** Red-eyed Vireo, 17.5 (58, 24); Blue-gray Gnatcatcher, 7.5 (25, 10); Field Sparrow, 6.5 (22, 9); Prairie Warbler, 6 (20, 8); Indigo Bunting, 6; Yellow-breasted Chat, 5 (17, 7); Kentucky Warbler, 4.5 (15, 6); Cardinal, 4 (13, 5); White-eyed Vireo, 3.5 (12, 5); Ovenbird, 2.5; Carolina Chickadee, 2; Tufted Tit-

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Newark Quadrangle, USGS. **Continuity:** Established 1937; 44 intermittent years. **Size:** Approximately 14.16 ha = 35 acres. **Description of Plot:** See *Bird-Lore* 39:379-80 (1937). **Habitat changes:** Minor in nature and related to windfall or cut stems. **Weather:** Early May was above average temperature for first 20 days. **Coverage:** June 5, 23; Sept. 5. Total man-hours: 25. **Census:** Red-eyed Vireo, 8 (56, 23); Acadian Flycatcher, 6 (42, 17); Wood Thrush, 6; Am. Robin, 5 (35, 14); Scarlet Tanager, 5; Cerulean Warbler, 4 (28, 11); E. Wood Pewee, 3 (21, 9); House Wren, 3; Gray Catbird, 3; Cardinal, 3; Red-bellied Woodpecker, 2; Downy Woodpecker, 2; Great Crested Flycatcher, 2; E. Phoebe, 2; Tufted Titmouse, 2; White-breasted Nuthatch, 2; Yellow-throated Vireo, 2; Ovenbird, 2; Kentucky Warbler, 2; Mourning Dove, 1; Yellow-billed Cuckoo, 1; Ruby-throated Hummingbird, 1; Com. Flicker, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Blue Jay, 1; Carolina Chickadee, 1; Blue-gray Gnatcatcher, 1; Cedar Waxwing, 1; Warbling Vireo, 1; Louisiana Waterthrush, 1; N. Oriole, 1; Brown-headed Cowbird, 1; Rose-breasted Grosbeak, 1; Indigo Bunting, 1; Am. Goldfinch, 1; Chipping Sparrow, 1; Song Sparrow, 1. **Total:** 38 species; 83 pairs (586 km^2, 237/100 acres). **Remarks:** By May 20 local robins had fledglings out of the nest, able to fly strongly. Those pairs in the plot on June 5 had all young out of the nest, but none had started renesting. A total of 13 nests were found, much below pre-1979 levels. Cicadas supplied food, but they were less numerous than in 1965. No cowbird eggs or fledglings were discovered.—*A.H. CLAUGUS, 228 S. Lake St., Carey, OH 43316.*

89. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., Horse Cove Gap, about 4.5 mi S of Johnson City; 36°14'N, 82°22'W, Erwin Quadrangle, USGS. **Continuity:** Established 1975; 8 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29:1117-8 (1975). **Coverage:** May 15-16, 22-23, 26-27, 29-30; June 16; 0600-1000, EDT. Total man-hours: 10. **Census:** Rufous-sided Towhee, 25 (124, 50); Hooded Warbler, 20 (99, 40); Yellow-breasted Chat, 9 (44, 18); Cardinal, 9; White-eyed Vireo, 5 (25, 10); Indigo Bunting, 4 (20, 8); Kentucky Warbler, 3 (15, 6); Ruby-throated Hummingbird, 2; Red-eyed Vireo, 2; Black-and-white Warbler, 2; Yellow-billed Cuckoo, 1; Whip-poor-will, 1; Carolina Chicadee, 1; Carolina Wren, 1; Gray Catbird, 1; Wood Thrush, 1; Blue-gray Gnatcatcher, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1. **Total:** 19 species; 90 territorial males or females (445/km^2, 180/100 acres). **Remarks:** New breeding species for the plot: Wood Thrush. After the sudden appearance of the Swainson's Warbler as a breeding species in 1981 (4 territories), this species was totally absent this year. Highest number of territories yet for Hooded Warbler (previous high 14 in 1981) and Cardinal (previous high 5 in 1981). A new plot near this one, Mixed Deciduous Forest (Census no. 47), was censused this year for comparison. The new plot represents a close approximation of the habitat that existed on this plot before it was clearcut. Total species on the clearcut plot was 7 less than the wooded plot, however, total territories per 100 acres was 53% higher on the clearcut plot. Hooded Warblers show a definite preference for the 10-year old clearcut with territories being approximately 4 times more dense on the clearcut than the wooded plot.—*RICHARD LEWIS, Rt. 3, Box 470, Bristol, TN 37620.*

90. MIXED - MESOPHYTIC WOODS, FIELDS, AND BRUSH. — Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob; 36°9'45"N, 85°22'W, Monterey Quadrangle, USGS. **Continuity:** Established 1977; 6 consecutive years. **Size:** 27.0 ha = 66.7 acres (resurveyed using steel tape). **Description of Plot:** See *AB* 32: 80 (1978) and 33: 79 (1979). **Changes:** About 4½ (out of ca. 13) acres of brushy fields were mowed between late October and January; most of this acreage was remowed between April and late August 1982. An additional ⅓ acre was mowed and then bulldozed during construction of a pond (near the E end) during February. **Weather:** Freezes during late March injured some early foliage and flowers. No droughts this breeding season; rainfall somewhat above normal, no floods during late April-mid July. Temperatures slightly cooler than normal, especially in July and Aug.: 0-22°C (32-72°F) during census trips. **Coverage:** Mar. 3, 12, 18, 20; Apr. 1, 12, 15, 20, 23, 25-26; May 1-2, 5-7, 11, 13, 15, 17, 19, 21, 24, 28, 30; June 5, 8, 13, 23; mostly 0430-0830. Most trips covered ½-¾ of plot. Total man-hours: 56. **Census:** Red-eyed Vireo, 19.5 (72, 29); Field Sparrow, 9 (33, 13); Indigo Bunting, 7.5 (28, 11); Blue-gray Gnatcatcher, 7 (26, 10); Prairie Warbler, 6 (22, 9); Yellow-breasted Chat, 5.5 (20, 8); Cardinal, 5.5; White-eyed Vireo, 5 (19, 7); Carolina Chickadee, 3.5 (13, 5); Kentucky Warbler, 3 (11, 4); Tufted Titmouse, 2.5; Ovenbird, 2.5; Downy Woodpecker, 2; Black-and-white Warbler, 2; Com. Yellowthroat, 2; Summer Tanager, 2; Rufous-sided Towhee, 2; Yellow-billed Cuckoo, 1.5; Ruby-throated Hummingbird, 1.5; Red-bellied Woodpecker, 1.5; Worm-eating Warbler, 1.5; Hooded Warbler, 1.5; Scarlet Tanager, 1.5; Broad-winged Hawk, 1; Am. Woodcock, 1; Whip-poor-will, 1; Hairy Woodpecker, 1; E. Phoebe, 1; Acadian Flycatcher, 1; Wood Thrush, 1; E. Bluebird, 1; Yellow-throated Vireo, 1; Blue-winged Warbler, 1; Brown-headed Cowbird, 1; Chipping Sparrow, 1; Mourning Dove, 0.5; Pileated Woodpecker, 0.5; White-breasted Nuthatch, 0.5; Carolina Wren, 0.5; Am. Goldfinch, 0.5; Chuck-will's-widow, +; E. Wood Pewee, +; Blue Jay, +. **Total:** 43 species; 110 territorial males or females (408/km^2, 165/100 acres). **Visitors:** Chimney Swift, Com. Crow, Turkey Vulture, Sharp-shinned Hawk, Red-tailed Hawk, Barn Swallow, Purple Martin, Brown Thrasher, Am. Robin. **Remarks:** Nests or nest-holes found: Am. Woodcock, 1; Ruby-throated Hummingbird, 1; Hairy Woodpecker, 1; E. Phoebe, 1; E. Bluebird, 1; Blue-gray Gnatcatcher, 1; Field Sparrow, 1. Both the Blue-winged Warbler and Chipping Sparrow (pair) disappeared by late May; losses from predation may explain this. Some chats shifted territories during the season, perhaps indicating a lack of female chats or of sufficient nesting cover. Most resident species increased in numbers this year.—*RICHARD W. SIMMERS, JR., Box 170, Rt. 6, Cookeville, TN 38501.*

91. SUBURBAN CEMETERY. — Location: Alabama; Jefferson Co., Birmingham, Oakland Cemetery, immediately NE of intersection of Pike and Warrior Rds in Ensley section; 33°29'N, 86°54'W, Bessemer Quadrangle, USGS. **Continuity:** Established 1978; 5 consecutive years. **Size:** 15 ha = 37 acres. **Description of Plot:** See *AB* 34: 18-19 (1980). **Weather:** Consistently cool averaging −1.4° to −1.5°F/day throughout the period, ending in an annual deficiency of 310° for the 212-day period through July 31 (−1.46°/day). A wet June (double the normal) has increased the annual precipitation from 26.55 ins. on May 30 to 46.18 ins. (11.62 ins. in excess) by July 31. On June 28 a small tornado ripped through the tract uprooting at least 10 mature trees and damaging at least 20 others, many hollow. Most of the trees were *Quercus stellata, marilandica, falcata, velutina,* Sweet Gum, Hackberry, and mature cherry in fruit. This damage to bird habitat was not nearly as severe as that done by the frenzy of clearing of wires by power company crews. The loss of bird habitat was especially noted in the loss of hollow trees for roosting and nesting, and the loss of ripe fruit (cherries) but not green fruit. A sharp drop in robins immediately after the storm may be partly due to post-breeding dispersal as shown in prior years, but its very sharpness, a 50% overnight drop, points to the storm. **Coverage:** Mar. 1 to July 31; 0800-2000, 144 ½-hr trips in the 152-day period, virtually daily accompanied by Collie dog. Total man-hours: 72. **Census:** (See *AB* 36:14 for Breeding Bird Criteria) *Confirmed breeders:* Starling, 15 (100, 41); House Sparrow, 12 (80, 32); Am. Robin, 11 (73, 30); Cardinal, 9 (60, 24); Blue Jay, 7 (47, 19); Mockingbird, 7; Mourning Dove, 5 (33, 14); Rock Dove, 4 (27, 11); Rufous-sided Towhee, 4; Com. Grackle, 3 (20, 8); Brown-headed Cowbird, 2, towhee the host at least three times, Wood Thrush once; Com. Flicker, 1; Red-bellied Woodpecker, 1; Downy Woodpecker, 1; Great Crested Flycatcher, 1; Carolina Chickadee, 1; Tufted Titmouse, 1; Gray Catbird, 1; Brown Thrasher, 1; Wood Thrush, 1; Red-winged Blackbird, +; *Probable breeders:* Chimney Swift, +; Red-headed Woodpecker, +; E. Wood Pewee, +; White-breasted Nuthatch, +; Carolina Wren, +; N. Parula, +; E. Meadowlark, +. **Total:** 28 species; 88 territorial males (588/km^2, 238/100 acres). **Visitors** (*Possible breeders* only): Yellow-crowned Night Heron, Bobwhite, Com. Nighthawk, E. Kingbird, Barn Swallow, Purple Martin, White-eyed Vireo. An additional 48 species were listed on the tract as non-breeders during the period; 16 of these wintered on the tract or nearby. **Remarks:** For all *confirmed breeders* dependent young were seen. The *probable* and *possible* breeders appeared to include the following categories: territory larger than the tract—did not occur daily—(most of the probable breeders, Com. Nighthawk); tract failed to meet their breeding requirements—in residence only part of the breeding season—(Bobwhite, E. Wood Pewee, White-eyed Vireo, N. Parula); post-breeding wanderers (most of the possible breeders plus more individuals of the confirmed breeders such as

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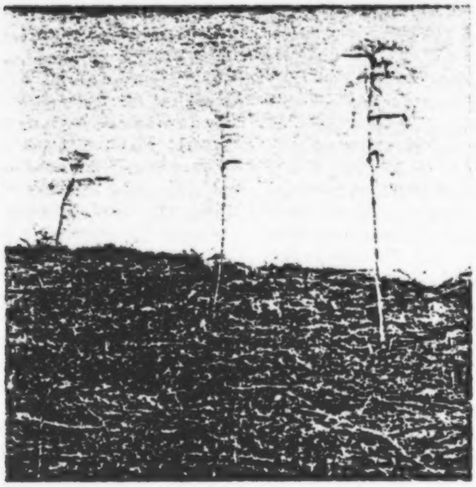
thanks to David Steingraeber for the quantitative habitat description and Charles Weise for general assistance. — *VERNON D. AUNE. S. 13. W. 22167 Ridge Road, Waukesha, Wis. 53186.*

79. DECIDUOUS CLEARCUT. — Location: Tennessee; Washington Co., House Cove Gap; about 4.5 mi S of Johnson City; 36°14′N. 82°22′W. Erwin Quadrangle. USGS. **Continuity:** Established 1975; 3 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB:* 1117-8 (1975). **Weather:** Generally warm and clear. **Coverage:** May 27-31; June 3-4, 6, 8; 0600-0800. Total man-hours: 13. **Census:** Indigo Bunting, 13 (64, 26)· Rufous-sided Towhee, 8 (40, 16); Yellow-breasted Chat, 6 (30, 12); White-eyed Vireo, 4 (20, 8); Kentucky Warbler, 4; Hooded Warbler, 4; Prairie Warbler, 3 (15, 6); Ruby-throated Hummingbird, 2; Cardinal, 2; Com. Flicker, 1; E. Wood Pewee, 1; Blue-gray Gnatcatcher, 1; Red-eyed Vireo, 1; Black-and-white Warbler, 1; Chestnut-sided Warbler, 1; Brown-headed Cowbird (female), 1; Downy Woodpecker, +. **Total:** 17 species; 53 territorial males or females (262/km², 106/100 acres). **Remarks:** Nest found, Com. Flicker. An increase of 65% in total density from last year was observed. some of the most noted increases included Indigo Bunting (9 to 13), White-eyed Vireo (+ to 4), Kentucky Warbler (2 to 4), Hooded Warbler (+ to 4), and Prairie Warbler (0 to 3). Carolina Wren, which was present in good numbers in the two previous censuses (5 in 1975 and 4 in 1976), was absent this year. The Chestnut-sided Warbler, which normally nests above 3500 ft elevation in this area, was unusual here (2400 ft). — *RICHARD LEWIS, Rte. 3, Rox 683B, Erwin, Tenn. 37650.*

80. PASTURES WITH BRUSH, WOODED STRIPS, AND SCATTERED TREES. — Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob; 36°9′45″N, 85°22′W, Monterey Quadrangle, USGS. **Continuity:** New. **Size:** About 8.7 ha = 21.5 acres (very irregular, surveyed with steel tape). **Description of Plot:** The 6 pastures (separated by hedgerows or wooded strips) are dominated by Fescue (*Festuca elatior*) in the less steep portions. Broomsedge (*Andropogon virginicus*) is abundant as are numerous other grasses and forbs. Scattered trees 3 to 15 in. dbh are in all the pastures; saplings are numerous in the brushy areas (mostly on steeper slopes). Frequent tree species are: Tulip-tree (*Liriodendron*), Flowering Dogwood (*Cornus florida*), Redbud (*Cercis*), Red Cedar (*Juniperus virginiana*), Virginia Pine (*Pinus virginiana*), Sourwood (*Oxydendrum*), Persimmon (*Diospyros*), Tupelo (*Nyssa sylvatica*), *Sassafras*, Red Maple (*Acer rubrum*), White Ash (*Fraxinus americana*), Winged Elm (*Ulmus alata*), Sycamore (*Platanus*), White Oak (*Quercus alba*) and other oaks, hickories (*Carya* spp.), Hornbeam (*Carpinus*), and Buckthorn (*Rhamnus caroliniana*). The bottomland wooded strips include many of the above trees, also Black Walnut (*Juglans nigra*), Beech (*Fagus*), Sugar Maple (*A. saccharum*), Buckeye (*Aesculus octandra*), Slippery Elm (*U. rubra*), and hackberry (*Celtis* sp.). Other numerous woody plants on the plot are brambles (*Rubus* spp.), Winged Sumac (*Rhus copallina*), Spicebush (*Lindera benzoin*), Strawberry-bush (*Euonymus americanus*), Prairie Rose (*Rosa setigera*), wild grapes (*Vitis* spp.), greenbrier (*Smilax* spp.), Honeysuckle (*Lonicera japonica*), Poison Ivy (*Rhus radicans*), and Cane (*Arundinaria gigantea*). Ground cover about 80 to 95%. Rocks, either detached or outcropping, of sandstone, limestone, or chert, are frequent. A rocky, usually dry creek crosses the plot; a jeep trail follows the bottom land and joins an improved dirt road at the NW end. **Edge:** Bordered on W by similar habitat; on other sides by woods or mixed-mesophytic forest. **Topography:** Gentle to rather steep (25%) slopes. **Elevation:** 1075-1280 ft. **Weather:** Rather hot, some dry spells (no severe drought). **Coverage:** May 11-12, 27, 31; June 2, 5-6, 17, 21; 0530-0900 (CDT), and 1930-2030. Total man-hours: 20½. **Census:** Indigo Bunting, 8.5 (98, 40); Field Sparrow, 5 (57, 23); Yellow-breasted Chat, 4.5 (52, 21); White-eyed Vireo, 4 (46, 19); Blue-gray Gnatcatcher, 3.5 (40, 16); Prairie Warbler, 3 (34, 14); Red-eyed Vireo, 2.5; E. Wood Pewee, 2; Rufous-sided Towhee, 2; Cerulean Warbler, 1.5; Summer Tanager, 1.5; Ruby-throated Hummingbird, 1; Kentucky Warbler, 1; Com. Yellowthroat, 1; Cardinal, 1; Am. Goldfinch, 1; Yellow-billed Cuckoo, 0.5; Downy Woodpecker, 0.5; Tufted Titmouse, 0.5; Brown-headed Cowbird, 0.5; Red-tailed Hawk, +; Broad-winged Hawk, +; Screech Owl, +; Whip-poor-will, +; Red-bellied Woodpecker, +; Hairy Woodpecker, +; Acadian Flycatcher, +; Carolina Chickadee, +; Yellow-throated Vireo, +; Scarlet Tanager, +. **Total:** 30 species; 45 territorial males or females (517/km², 209/100 acres). **Visitors:** Turkey Vulture, Sharp-shinned Hawk, Chimney Swift, Barn Swallow, Purple Martin, Com. Crow, E. Bluebird. **Remarks:** No active nests located. Young Field Sparrows were numerous. About 25-30 beef cattle grazed the plot throughout the period. — *RICHARD W. SIMMERS, JR., 128 Shipley St., Cookeville, Tenn. 38501.*

81. DECIDUOUS CLEARCUT. — Location: Georgia; Rabun Co.; Chattahoochee National Forest; 5 mi S of Clayton; Tiger Quadrangle, USGS. **Continuity:** New. **Size:** 6.88 ha = 17 acres (irregular, measured with tape). **Description of Plot:** The area was clearcut in 1974. Roads bulldozed and occasional trees left standing were Dogwood (*Cornus florida*), Sourwood (*Oxydendrum arboreum*), Serviceberry (*Amelanchier laevis*). The dominant sprout growth is from Red Maple (*Acer rubrum*), Black Gum (*Nyssa sylvatica*), Tulip-tree (*Liriodendron tulipifera*), Chestnut Oak (*Quercus prinus*), Black Locust (*Robinia pseudo-acacia*). Common shrubby species are Mountain Laurel (*Kalmia latifolia*), blackberry (*Rubus* sp.), Blueberry (*Vaccinium vacillans*). **Edge:** Bordered on the N by clearcut; E, W, S by mature forest; SE by graveled Eastman Mtn Road. The census was not conducted within 50 ft of the forest edge or the road. **Topography:** On the SE slope of Boggs Mountain. **Elevation:** 2160-2360 ft. **Weather:** Extremely hot and dry; rainfall below normal. **Coverage:** April 28; May 13-15, 22, 28-29; June 4-5, 10-11, 25; July 3; 0700-1200. Total man-hours: 21. **Census:** Rufous-sided Towhee, 10 (145, 59); Prairie Warbler, 4 (58, 24); Indigo Bunting, 3 (44, 18); Mourning Dove, 1; Carolina Wren, 1; Brown Thrasher, 1; E. Bluebird, 1; Yellow-breasted Chat, 1. **Total:** 8 species; 22 territorial males (320/km², 129/100 acres). **Visitors:** Ruffed Grouse, Bobwhite, Yellow-billed Cuckoo, Ruby-throated Hummingbird, Com. Flicker, Hairy Woodpecker, Great Crested Flycatcher, E. Phoebe, Blue Jay, Carolina Chickadee, Solitary Vireo, Red-eyed Vireo, Black-and-white Warbler, Pine Warbler, Ovenbird, Hooded Warbler, Brown-headed Cowbird, Scarlet Tanager, Cardinal,



Census 81. Deciduous Clearcut. Photo/Louis Schweizer.

Am. Goldfinch. **Remarks:** A Mourning Dove nest with 2 eggs was located on the ground. Special thanks to Marie and E. O. Mellinger, Beanie Newhall, Sybil Arbery, Hester Wilks, and Dorothy Ickringill for their assistance. — *LOUIS W. SCHWEIZER, 1729B LaVista Rd. NE, Atlanta, Ga. 30329.*

82. DISTURBED MIXED PRAIRIE. — Location: Illinois; Grundy Co.; Goose Lake Prairie State Park, near Morris; bordered on the W by the Elgin, Joliet and Eastern RR., on the N by Collins Road and on the E and S by similar prairie; 41°23'N, 88°18'W, Monooka Quadrangle, USGS. **Continuity:** Established 1975; 3 consecutive years. **Size:** 16 ha = 39.5 acres. **Description of Plot:** See *AB* 29:1121-1122 (1975). **Weather:** Predominantly overcast but little rain during coverage. Temperature 60-90°F. **Coverage:** May 1; June 1, 18-19, 26-27; July 2-4, 8, 24; August 7, 14; 0500-1300. Total man-hours: 103.5. **Census:** Red-winged Blackbird, 5 (31, 13); Bell's Vireo, 4 (25, 10); Black-capped Chickadee, 3 (19, 8); Ring-necked Pheasant, 2; Gray Catbird, 2; Am. Robin, 2; Indigo Bunting, 2; Field Sparrow, 2; Am. Woodcock, 1; Mourning Dove, 1; Com. Flicker, 1; Downy Woodpecker, 1; Brown Thrasher, 1; Com. Yellowthroat, 1; E. Meadowlark, 1; Cardinal; 1; Am. Goldfinch, 1; Rufous-sided Towhee, 1. **Total:** 18 species; 32 territorial males (200/km^2, 81/100 acres). **Remarks:** Potholes and slough, dry all winter, were partially filled by late May rains. Utility company cleared right-of-way decimating approximately 80,000 Black Willows (*Salix nigra*) of 1 in. and under. Correction to 1976 census: Delete European Tree Sparrow. Thanks to the Nyhoffs for their hospitality and help and to the Tweits for their continued support. — *JANICE LINKLETTER and FRED WOOLEY, 2211 W. Carmen Ave., Chicago, Ill. 60625.*

83. KENTUCKY BLUE GRASS PRAIRIE. — Location: North Dakota; Stutsman Co., NE quarter of Sect. 12, T142N, R68W; 47°8'N, 99°14'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 6 consecutive years. **Size:** 4.84 ha = 11.97 acres. **Description of Plot:** See *AB* 26:972 (1972). This plot was subjected to a prescribed burn in fall 1972, and again on June 1, 1977. Censuses were performed both before and after the 1977 burn. The fire reduced nearly all vegetation to ashes, but growth resumed almost immediately. The two small seasonal wetlands in the plot were dry throughout the census period. **Weather:** Following a very dry summer and fall of 1976, little precipitation occurred in winter or early spring, and conditions were dry through the middle of May. Frequent rains during late spring enabled vegetation to grow, but were inadequate to restore wetlands. Precipitation totaled 3.29 in. in May and 2 in. in June. Temperatures in May were much above normal, with average extremes of 77 and 52°F. June was somewhat warmer than average; the daily low averaged 53°, the daily high, 78°. Phenologically, the spring season seemed about two weeks advanced from normal, with respect to both plants and birds. **Coverage** (Pre-burn): May 24-25; June 1; 4 trips, 0655-1010, CDT. (Post-burn): June 2, 8, 16, 23, 29; July 6, 13; 7 trips, 0820-1040, CDT. Total man-hours: 3.2 **Census:** (Pre-burn): Bobolink, 1; W. Meadowlark, 1; Red-winged Blackbird, 1; Savannah Sparrow, 0.5; Grasshopper Sparrow, 0.5; Brown-headed Cowbird (female), +. (Post-burn): Upland Sandpiper, 2; Killdeer, 1; W. Meadowlark, +; Red-winged Blackbird, +; Brown-headed Cowbird (female), +. **Total:** (Pre-burn): 6 species; 4 territorial males or females (83/km^2, 33/100 acres). (Post-burn): 5 species; 3 territorial males (62/km^2, 25/100 acres). **Visitors:** (Pre-burn): Blue-winged Teal, Killdeer, Willet, E. Kingbird, W. Kingbird, Barn Swallow, Yellow-headed Blackbird. (Post-burn): Red-tailed Hawk, Marbled Godwit, Com. Nighthawk, E. Kingbird, Tree Swallow, Cliff Swallow, Yellow-headed Blackbird, Com. Grackle. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

84. MIXED PRAIRIE (I). — Location: North Dakota; Stutsman Co., NE quarter of Sect. 11, T142N, R68W; 47°8'N, 99°15'W, Woodworth Quadrangle, USGS. **Continuity:** Established 1972; 6 consecutive years. **Size:** 10 ha = 24.7 acres. **Description of Plot:** See *AB* 26:972 (1972). All wetlands were dry throughout the census period. **Weather:** See Census 83. **Coverage:** May 19, 24-25; June 1-2, 8, 16, 23; 8 trips, 0655-1000, CDT. Total man-hours: 6.5 **Census:** Clay-colored Sparrow, 7 (70, 28); Red-winged Blackbird, 3 (30, 12); Brown-headed Cowbird (females), 2; Bobolink, 1.5; W. Meadowlark, 1.5; Willow Flycatcher, 1; Gray Catbird, 1; Yellow Warbler, 1; Com. Yellowthroat, 1; Grasshopper Sparrow, 1; Mourning Dove, 0.5; E. Kingbird, 0.5; Savannah Sparrow, 0.5. **Total:** 13 species; 21.5 territorial males or females (215/km^2, 87/100 acres). **Visitors:** Mallard, Gadwall, Blue-winged Teal, Ring-necked Pheasant, Killdeer, Upland Sandpiper, Willet, Barn Swallow, Cliff Swallow, Brown Thrasher, Am. Goldfinch. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

85. MIXED PRAIRIE (II). — Location: North Dakota; Stutsman Co., SW quarter of Sect. 1, T142N, R68W; 47°8'N, 99°15'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 6 consecutive years. **Size:** 6.1 ha = 15.06 acres. **Description of Plot:** See *AB* 26:972-973 (1972). This plot was burned in fall 1971 and spring 1976. Since the last burn, the vegetation, nearly all

From: AB 33(1):79-80;1979

Warbler, 5.5 (24, 10); Scarlet Tanager, 3.5 (15, 6); Carolina Chickadee, 3 (13, 5); Wood Thrush, 3; Blue-gray Gnatcatcher, 3; Hooded Warbler, 3; Whip-poor-will, 2; Tufted Titmouse, 2; Yellow-throated Vireo, 2; Cerulean Warbler, 2; Am. Redstart, 2; Brown-headed Cowbird 2; Am. Goldfinch, 2; Kentucky Warbler, 1.5; E. Phoebe, 1; Acadian Flycatcher, 1; Rough-winged Swallow, 1; Golden-winged Warbler, 1; Sharp-shinned Hawk, +; Screech Owl, +; White-breasted Nuthatch, +; Com. Crow, +; Chestnut-sided Warbler, +; Summer Tanager, +. **Total:** 29 species; 73 territorial males or females (312/km^2, 126/100 acres). **Visitors:** Yellow-billed Cuckoo, Ruby-throated Hummingbird, Hairy Woodpecker, Downy Woodpecker, Blue Jay, Cedar Waxwing, Field Sparrow. **Remarks:** Nests found: Whip-poor-will, E. Phoebe, Ovenbird, Rufous-sided Towhee, 1 each. Fledglings noted: Carolina Chickadee, Blue-gray Gnatcatcher, Worm-eating Warbler, Golden-winged Warbler, Ovenbird, Kentucky Warbler. Small wooded patches on the mine were visited by Red-eyed Vireos, Black-and-white Warblers, Worm-eating Warblers, and Kentucky Warblers; an Ovenbird may have nested in one of the patches. Sharp-shinned Hawk observed on 2 visits, Summer Tanager on 3. This study was funded by an orphan mine reclamation project coordinated by the Tennessee Valley Authority. — *CHARLES P. NICHOLSON, P.O. Box 402, Norris, Tenn. 37828.*

87. MIXED - MESOPHYTIC WOODS, FIELDS, AND BRUSH. — Location: Tennessee: Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob; 36°9'45"N, 85°22'W, Monterey Quadrangle, USGS. **Continuity:** Wooded portions (about 53 acres) new; open portions established 1977. (Formerly called Pastures with Brush, Wooded Strips, and Scattered Trees). **Size:** 30 ha = 74 acres (irregular, taken largely from official property survey map). **Description of Plot:** See *AB* 32:80 (1978). The most abundant tree, the Tulip-tree (*Liriodendron tulipifera*), is mostly on the N slope. White Oak (*Quercus alba*) is an important species almost confined to the S slope. Other numerous tree species attaining a dbh over 6 in. dbh) are: Sugar Maple (*Acer saccharum*), Red Maple (*A. rubrum*), N. Red Oak (*Q. rubra*), Chinquapin Oak (*Q. muehlenbergii*), Black Oak (*Q. velutina*), Shagbark Hickory (*Carya ovata*), Am. Beech (*Fagus grandifolia*), White Ash (*Fraxinus americana*), and Yellow Buckeye (*Aesculus octandra*). Numerous trees of lesser size are Flowering Dogwood (*Cornus florida*), Hornbeam (*Carpinus*), *Sassafras*, Sourwood (*Oxydendrum*), Redbud (*Cercis canadensis*), and locally, Red Cedar (*Juniperus virginiana*). Rather frequent tree species attaining a larger size (over 6 in. dbh) are White Basswood (*Tilia heterophylla*), Winged Elm (*Ulmus alata*), Black Gum (*Nyssa sylvatica*), Persimmon (*Diospyros*), Bitternut Hickory (*C. cordiformis*), Mockernut Hickory (*C. tomentosa*), Pignut Hickory (*C. ovalis* and *C. glabra*), Cucumber Tree (*Magnolia acuminata*), Black Walnut (*Juglans nigra*), and Shumard Oak (*Q. shumardii*). Grape vines (*Vitis aestivalis*) are often numerous, and attain the canopy. Other vines are Crossvine (*Anisostichus capreolata*), Virginia Creeper (*Parthenocissus quinquefolia*), and Poison Ivy (*Rhus radicans*), all numerous and all often forming part of the ground cover. Herbaceous species are very numerous. Rocks, both limestone and sandstone, usually with mosses and lichens on them, form about 20-25% of the ground cover. **Changes:** No grazing this year. A small orchard and vegetable garden were planted, altering about 2 acres. **Weather:** Early spring warm and dry; killing frost April 22 damaged some tender foliage in the open. Summer temperatures about normal; quite dry in late June — early July; August very wet (flooding Aug. 20). **Coverage:** Apr. 14, 22, 27; May 2, 6-7, 10-11, 17-19, 31; June 4-5, 10, 14, 16, 23; evening trips May 21, 29; June 10; Aug. 10; 0457-2035 hours, CDT. Total man-hours: 54. **Census:** Red-eyed Vireo, 23.5 (78, 32); Indigo Bunting, 7.5 (25, 10); Blue-gray Gnatcatcher, 7 (23, 9); Acadian Flycatcher, 6.5 (22, 9); Yellow-breasted Chat, 5 (17, 7); Prairie Warbler, 4.5 (15, 6); Kentucky Warbler, 4 (13, 5); Yellow-billed Cuckoo, 3 (10, 4); Tufted Titmouse, 3; Cardinal, 3; Scarlet Tanager, 2.5; Rufous-sided Towhee, 2.5; Field Sparrow, 2.5; Ruby-throated Hummingbird, 2; White-eyed Vireo, 2; Com. Yellowthroat, 2; Hooded Warbler, 2; Summer Tanager, 2; Whip-poor-will, 1.5; Carolina Chickadee, 1.5; Wood Thrush, 1.5; Ovenbird, 1.5; Pileated Woodpecker, 1; Red-bellied Woodpecker, 1; Yellow-throated Vireo, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1; Am. Goldfinch, 1; Mourning Dove, 0.5; Screech Owl, 0.5; Hairy Woodpecker, 0.5; Blue Jay, 0.5; Brown Thrasher, 0.5; Red-tailed Hawk, +; Broad-winged Hawk, +; E. Meadowlark, +. **Total:** 36 species; 99 territorial males or females (331 /km^2, 134/100 acres). **Visitors:** Turkey Vulture, Sharp-shinned Hawk, Ruffed Grouse, Chimney Swift, Com. Crow, Cerulean Warbler, Red-winged Blackbird, Blue Grosbeak. **Remarks:** Nests found: 1 Kentucky Warbler, 1 Field Sparrow. Young seen include 1 Red-tailed Hawk (nest off plot; also in 1977), Indigo Bunting, and Field Sparrow. There was an emergence (not large) of 17-year cicadas (3 species) in early June. — *RICHARD W. SIMMERS, JR., 515 Laurel Ave., Apt. 9, Cookeville, Tenn. 38501.*

88. STRIP MINE AND DECIDUOUS WOODLOT. — Location: Tennessee; Scott Co., 2.3 mi NW of Winfield, 36°34'23"N, 84°29'13"W; Winfield Quadrangle. **Continuity:** New. **Size:** 20.1 ha = 49.6 acre (measured by planimeter from aerial photo). **Description of Plot:** A horseshoe-shaped strip mine enclosing a 3.9 ha = 9.6 acre woodlot. The E arm of the mine was mined in 1973, and the W part in 1970. Mining was carried out by scraping off the vegetation and topsoil, removing the exposed coal seam, and then some regrading of topsoil. The resultant disturbed areas are fairly level, with the only major topographic feature being a rock and dirt highwall surrounding the woodlot. Mined areas have scattered herbaceous and shrub growth, which is denser and taller on the E arm. Most of the W area is exposed mineral soil. Most common shrubs are *Rosa multiflora*, Pokeweed (*Phytolacca americana*), Elderberry (*Sambucus canadensis*), *Rubus*, Staghorn Sumac (*Rhus typina*), Shortleaf Pine (*Pinus echinata*) and Virginia Pine (*P. virginianum*). Herbaceous cover consists of various grasses including Broomsedge (*Andropogon virginianum*), goldenrod (*Solidago* spp.), *Lespedeza*, Patridge Pea (*Cassia fasciculata*), and Ragwort (*Senicio smalli*). Seven ponds, the largest 0.3 ha cover a total area of 1.1 ha and surround part of the woodlot. Three of these ponds support stands of Cat-tail (*Typha latifolia*). Dirt roads cross the W part of the mine and the woodlot. The woodlot is located on the S end and is connected to surrounding forest by a fencerow on the E and a wooded strip 20-35 m wide on the W. Major tree species and stems/acre, in decreasing order of abundance, are Red Maple (*Acer rubrum*) 146, Chestnut Oak (*Quercus prinus*) 58, Sourwood (*Oxydendrum arboreum*), White Oak (*Q. alba*) 21, and Flowering Dogwood (*Cornus florida*) 21. Stems/acre and basal area (ft^2/acre) by diameter size classes are: A (3-6 in.) 241, 266; B (6-9 in.) 96, 293; C (9-15 in.) 29, 324. Shrub stems averaged 13,905/acre; ground cover 23%; canopy cover 80%; canopy height 27 ft (range 15-40 ft). **Edge:** Similar mines adjoin the N side; the E and W sides are mixed forest. The census area extended approximately 25 m into the forest. A hardwood clearcut, approximately 5 year old, adjoins the NW corner and a pasture is S of the plot. **Topography:** The E part of the mine is flat, and the W has several gullies crossing it. The woodlot is rolling, and separated from the mined area by a highwall with a maximum height of 9 m. There is no outslop area. Average elevation is 423 m and maximum relief is 20 m. **Weather:** Mid-May cool and wet; otherwise warm and dry. Temperature during censuses 60-90°F. **Coverage:** May 10, 26; June 2, 18, 20, 26, 29; 0630-1200, EDT. Total man-hours: 16.5. **Census:** Indigo Bunting, 14 (70, 28); Field Sparrow, 5 (25, 10); Rough-winged Swallow, 3 (15, 6); Blue-gray Gnatcatcher, 3; Red-eyed Vireo, 3; Prairie Warbler, 3; Red-winged Blackbird, 3; Cardinal, 2.5; White-eyed Vireo, 2; Am. Goldfinch, 2; Yellow-breasted Chat, 1.5; Mourning Dove, 1; Yellow-billed Cuckoo, 1; E. Kingbird, 1; Tufted Titmouse, 1; Brown Thrasher, 1; Yellow-throated Vireo, 1; Brown-headed Cowbird (female), 1; Rufous-sided Towhee, 1; Bobwhite, +; Pine Warbler, +. **Total:** 21 species; 50 territorial males or females (249/km^2, 101/100 acre). **Visitors:** Wood Duck, Ruby-throated Hummingbird, Belted Kingfisher, Com. Flicker, Pileated Woodpecker, Downy Woodpecker, Great Crested Flycatcher, Barn Swallow, Blue Jay, Com. Crow, Carolina Chickadee, Gray Catbird, E. Bluebird, E Meadowlark, Summer Tanager. **Remarks:** At least 2 pairs of Rough-winged Swallows nested in the highwalls above the ponds; 11 Red-winged Blackbird and 1 Prairie Warbler nests were found. The absence of breeding warblers in the woodlot was unexpected. This study was funded by an orphan mine reclamation project coordinated by the Tennessee Valley Authority. — *CHARLES P. NICHOLSON, P.O. Box 402, Norris, Tenn. 37828.*

89. DECIDUOUS CLEARCUT. — Location: Georgia; Rabun Co., Chattahoochee National Forest; 5 mi SE of Clayton; Tiger Quadrangle, USGS. **Continuity:** Established 1977. **Size:** 6.88 ha = 17 acres. **Description of Plot:** See *AB* 32:80-1 (1977). **Weather:** Warm and clear. **Coverage:** May 6-7, 19, 21; June 3, 10, 18, 24; 0730-0930. Total man-hours: 17. **Census:** Rufous-sided Towhee, 12 (174, 71); Indigo Bunting, 4 (58, 24); Prairie Warbler, 4; Bobwhite, 2; Mourning Dove, 1; Carolina

Chickadee, 1; Brown-headed Nuthatch, 1; Carolina Wren, 1; Brown Thrasher, 1; E. Bluebird, 1; Yellow-breasted Chat, 1; Brown-headed Cowbird, 1; Cardinal, 1; Am. Goldfinch, 1. **Total:** 14 species; 32 territorial males or females (465/km^2, 188/100 acres). **Visitors:** Chimney Swift, Ruby-throated Hummingbird, Com. Flicker, Pileated Woodpecker, Great Crested Flycatcher, E. Phoebe, Purple Martin, Barn Swallow, Blue Jay, Com. Crow, Tufted Titmouse, Gray Catbird, Blue-gray Gnatcatcher, Solitary Vireo, Red-eyed Vireo, Chestnut-sided Warbler, N. Oriole, Scarlet Tanager, Summer Tanager. **Remarks:** Nests found: Bluebird and Brown-headed Nuthatch. The Brown-headed Nuthatch represented a range extension of 7 mi farther N in the country than previously recorded. There was an increase of 6 breeding species from the previous census. — *LOUIS W. SCHWEIZER, 1729B LaVista Rd. NE, Atlanta, Ga. 30329.*

90. KENTUCKY BLUE GRASS PRAIRIE. — Location: North Dakota; Stutsman Co., NE quarter of Sec. 12, T142N, R68W; 47°8'N, 99°14'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 4.86 ha = 12 acres. **Description of Plot:** See *AB* 26:972 (1972). This plot was subjected to a prescribed burn in fall 1972, and on June 1, 1977. **Weather:** After several years of subnormal precipitation, rains in the latter half of 1977 and snow during the following winter resulted in a return to typical conditions. Most seasonal and semipermanent wetlands contained water during the census period. Precipitation totaled 3.08 in. in May and 4.02 in. in June. Temperatures in May were above normal, with average extremes of 43° and 72°F. June temperatures were approximately average: the daily low averaged 49°, the high, 78°F. **Coverage:** May 29; June 2, 4, 6, 8, 28; 8 trips, 0645-1140, CDT. Total man-hours: 3. **Census:** Bobolink, 2; Red-winged Blackbird, 1; Short-billed Marsh Wren, 0.5; W. Meadowlark, 0.5; Brown-headed Cowbird (female), 0.5. **Total:** 5 species; 4.5 territorial males or females (93/km^2, 38/100 acres). **Visitors:** Com. Snipe, E. Kingbird, Bank Swallow, Barn Swallow, Am. Goldfinch. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

91. MIXED PRAIRIE I. — Location: North Dakota; Stutsman Co., NE quarter of Sec. 11, T142N, R68W; 47°8'N, 99°15'W, Woodworth Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 10 ha = 24.7 acres. **Description of Plot:** See *AB* 26:972 (1972). All wetlands were restored by precipitation prior to census period. **Weather:** See Census 90. **Coverage:** May 29; June 2, 6, 8, 28; 8 trips, 0705-1120, CDT. Total man-hours: 7. **Census:** Clay-colored Sparrow, 4.5 (45, 18); Blue-winged Teal, 3.5 (35, 14); Red-winged Blackbird, 3.5; Com. Yellowthroat, 2.5; W. Meadowlark, 2; Brown-headed Cowbird (females), 2; Willow Flycatcher, 1; Yellow Warbler, 1; Bobolink, 1; Gadwall, 0.5; Pintail, 0.5; E. Kingbird, 0.5; Com. Snipe, +; Am. Goldfinch, +; Savannah Sparrow, +. **Total:** 15 species; 22.5 territorial males or females (225/km^2, 91/100 acres). **Visitors:** Black-crowned Night Heron, Am. Bittern, Mallard, Green-winged Teal, Upland Sandpiper, W. Kingbird, Barn Swallow, Gray Catbird, Com. Grackle. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

92. MIXED PRAIRIE II. — Location: North Dakota; Stutsman Co., SW quarter of Sec. 1, T142N, R68W; 47°8'N, 99°15'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 6.1 ha = 15.06 acres. **Description of Plot:** See *AB* 26: 972-973 (1972) and *AB* 32:81-82 (1978). This plot was burned in fall 1971 and spring 1976. Since the last burn, the vegetation, nearly all herbaceous, has regrown and litter has accumulated. All six seasonal wetlands were wet, but the two temporary wetlands were mostly dry throughout the census period. **Weather:** See Census 90. **Coverage:** May 29; June 2, 4, 6, 8, 28; 8 trips, 0710-0935, CDT. Total man-hours: 4. **Census:** Red-winged Blackbird, 2; Blue-winged Teal, 1.5; W. Meadowlark, 1; Killdeer, 0.5; Com. Snipe, 0.5; Brown-headed Cowbird (female), 0.5; E. Kingbird, +; Com. Yellowthroat, +; Savannah Sparrow, +. **Total:** 9 species; 6 territorial males or females (98/km^2, 40/100 acres). **Visitors:** Pintail, N. Shoveler, Mourning Dove, W. Kingbird, Yellow-headed Blackbird, N. Oriole, Com. Grackle. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

93. MIXED PRAIRIE III. — Location: North Dakota; Stutsman Co., NW quarter of SW quarter of Sec. 6, T142N, R67W; 47°9'N, 99°14'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 6.1 ha = 15.06 acres. **Description of Plot:** See *AB* 26:973 (1972). This plot was burned fall 1970, spring 1975, and again on June 1, 1977. Herbaceous vegetation has substantially regrown, but shrubs (mostly Wolfberry, *Symphoricarpos occidentalis*) are still reduced in stature. **Weather:** See Census 90. **Coverage:** May 29; June 2, 4, 6, 8, 28; 8 trips, 0740-1125, CDT. Total man-hours: 3. **Census:** Bobolink, 1; W. Meadowlark, 1; Red-winged Blackbird, 0.5; Brown-headed Cowbird (female), 0.5; Chestnut-collared Longspur, +. **Total:** 5 species; 3 territorial males or females (49/km^2, 20/100 acres). **Visitors:** Pintail, Com. Snipe, Com. Nighthawk, Yellow-headed Blackbird, Am. Goldfinch, Savannah Sparrow. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

94. MIXED PRAIRIE IV. — Location: North Dakota; Stutsman Co., SE quarter of Sec. 11, T142N, R68W; 47°8'N, 99°15'W, Woodworth Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 6.1 ha = 15.06 acres. **Description of Plot:** See *AB* 26:973-974 (1972). This plot was burned in spring 1970, fall 1972, and again spring 1976. Vegetation has regrown since the last fire. Wetlands contained water during the census period. **Weather:** See Census 90. **Coverage:** May 29; June 2, 4, 6, 8, 28; 8 trips, 0720-0955, CDT. Total man-hours: 4. **Census:** Red-winged Blackbird, 3 (49, 20); Blue-winged Teal, 1; W. Meadowlark, 1; Brown-headed Cowbird (female), 1; Bobolink, 0.5; Com. Snipe, +; Upland Sandpiper, +; E. Kingbird, +; Com. Yellowthroat, +; Grasshopper Sparrow, +. **Total:** 10 species; 6.5 territorial males or females (107/km^2, 43/100 acres). **Visitors:** Pintail, N. Shoveler, Sharp-tailed Grouse, W. Kingbird, Yellow-headed Blackbird, Com. Grackle, Am. Goldfinch. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

95. MIXED PRAIRIE V. — Location: North Dakota; Stutsman Co., SE quarter of Sec. 12, T142N, R68W; 47°8'N, 99°14'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 7 consecutive years. **Size:** 6.1 ha = 15.06 acres. **Description of Plot:** See *AB* 26:974 (1972) and *AB* 32:82 (1978). **Weather:** See Census 90. **Coverage:** May 29; June 2, 4, 6, 8, 28; 8 trips, 0645-1045, CDT. Total man-hours: 4.5. **Census:** Grasshopper Sparrow, 3 (49, 20); Bobolink, 2; W. Meadowlark, 1.5; E. Kingbird, 1; Brown-headed Cowbird (female), 1; Clay-colored Sparrow, 1; Chestnut-collared Longspur, 1; Willet, +; Marbled Godwit, +; Short-eared Owl, +; Com. Nighthawk, +. **Total:** 11 species; 10.5 territorial males or females (172/km^2, 70/100 acres). **Visitors:** Sharp-tailed Grouse, Killdeer, Bank Swallow, Barn Swallow, Am. Goldfinch, Savannah Sparrow, Baird's Sparrow. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

96. MIXED PRAIRIE VIII. — Location: North Dakota; Stutsman Co., NW quarter of Sec. 1, T142N, R68W; 47°9'N, 99°14'W, Goldwin Quadrangle, USGS. **Continuity:** Established 1973; 3 intermittent years. **Size:** 8.7 ha = 21.5 acres. **Description of Plot:** See *AB* 27:990 (1973) and*AB* 32:82 (1978). Seven seasonal wetlands partially or entirely within the plot contained water throughout the census period. **Weather:** See Census 90. **Coverage:** May 29; June 2, 4, 6, 8; 7 trips, 0700-1205, CDT. Total man-hours: 4. **Census:** Red-winged Blackbird, 4 (46, 19); Blue-winged Teal, 2.5; W. Meadowlark, 1.5; Brown-headed Cowbird (female), 0.5; Savannah Sparrow, 0.5; Gadwall, +; Sharp-tailed Grouse, +; Killdeer, +. **Total:** 8 species; 9 territorial males or females (103/km^2, 42/100 acres). **Visitors:** Mallard, N. Shoveler, Am. Coot, Com. Snipe, Willet, Marbled Godwit, Black Tern, Com. Nighthawk, E. Kingbird, Yellow-headed Blackbird. — *DOUGLAS H. JOHNSON, Northern Prairie Wildlife Research Center, Jamestown, N.D. 58401.*

97. FLOODPLAIN TALLGRASS PRAIRIE. — Location: Kansas, Douglas Co., portion of Baker Wetlands Research Area (Baker Univ., Baldwin City). It occupies much of the NW ¼, SW 1.4, Section 18, T13N, R20E, Lawrence East Quadrangle, USGS. **Continuity:** Established 1974; censused 1974-78 but results published only for 1974, 1975 and 1978. **Size:** 10.1 ha = 25 acres. **Description of Plot:** See *AB* 28:1031-1032 (1974). **Weather:** The mean temperature during the period was 26° C, slightly higher than the June average. Rainfall was 6.4 cm below normal for June (1.5 cm fell during study period). **Coverage:** June 21-27; 0600-1100. Total man-hours: 72. **Census:** Dickcissel, 24 (237, 96); Com. Yellowthroat, 7 (69, 28); Red-winged Blackbird, 5 (49, 20); Bobwhite, 1; E. Meadowlark, 1. **Total:** 5 species; 38 territorial males (376/km^2, 152/100 acres). **Remarks:** An Am. Kestrel flew over during several censuses

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Bachman's Sparrow, 1; Broad-winged Hawk, 0.5; Pileated Woodpecker, 0.5; Red-bellied Woodpecker, 0.5; Blue-winged Warbler, 0.5; Red-tailed Hawk, +; Ruffed Grouse, +; Mourning Dove, +; Screech Owl, +; Barred Owl, +; Hairy Woodpecker, +; E. Wood Pewee, +; Carolina Wren, +; Brown Thrasher, +; Am. Goldfinch, +. **Total:** 44 species; 95.5 territorial males or females (319/km², 129/100 acres). **Visitors:** Turkey Vulture, Chimney Swift, E. Kingbird, Great Crested Flycatcher, Barn Swallow, Purple Martin, Com. Crow, E. Bluebird, Cerulean Warbler, Blue Grosbeak, Chipping Sparrow. **Remarks:** Despite the larger species total, the total density declined slightly from 1978. Of the neotropical element only the White-eyed Vireo, Yellow-throated Vireo, Blue-winged Warbler, and Prairie Warbler showed real increases. Kathryn and Sam Coward, Bill Jones, Amy Johnson, and Patty Boles helped confirm several species, notably the Bachman's Sparrow; their time (about an hour each) is not included. — *RICHARD W. SIMMERS, JR., Route 6, Box 211-C, Cookeville, Tenn. 38501.*

86. STRIP MINE AND DECIDUOUS WOODLOT. — Location: Tennessee: Scott Co., 2.3 mi NW of Winfield, 36°34′23″N, 84°29′13″W; Winfield Quadrangle. **Continuity:** Established 1978. **Size:** 20.1 ha = 49.6 acres. **Description of Plot:** See *AB* 33:79 (1979). Ground cover on the E portion of the mine increased from 30 to 48%, mostly a result of increases in *Lespedeza* and *Melilotus*. Pine seedlings were planted on the same area in fall of 1978, at approximately 2 × 2 m spacing. The remainder of the area is essentially unchanged. **Weather:** May dry and warm; June slightly cooler than normal. Temperature 45-80°F. **Coverage:** May 7, 16; June 4, 13, 25-26; 0615-0930, 2015-2215, EDT. Total man-hours: 15. **Census:** Indigo Bunting, 11 (55, 22); Field Sparrow, 8.5 (42, 17); Prairie Warbler, 5.5 (27, 11); Rufous-sided Towhee, 3.5 (17, 7); Rough-winged Swallow, 2; Blue-gray Gnatcatcher, 2; Red-eyed Vireo, 2; Red-winged Blackbird, 2; Cardinal, 2; Whip-poor-will, 1; Ruby-throated Hummingbird, 1; Tufted Titmouse, 1; Brown Thrasher, 1; Yellow-breasted Chat, 1; Brown-headed Cowbird (female), 1; Am. Goldfinch, 1; Song Sparrow, 1; Yellow-billed Cuckoo, 0.5; Screech Owl, +; Great Crested Flycatcher, +; Com. Crow, +; White-eyed Vireo, +. **Total:** 22 species; 47 territorial males or females (234/km², 95/100 acres). **Visitors:** Green Heron, E. Phoebe, Barn Swallow, E. Bluebird, Yellow-throated Vireo, Golden-winged Warbler, Yellow-throated Warbler, Chestnut-sided Warbler, Blue Grosbeak. **Remarks:** Nests found: Field Sparrow, 4; Brown Thrasher, Prairie Warbler, Cardinal, 1 each. This study was funded by an orphan mine reclamation project coordinated by the Tennessee Valley Authority. — *CHARLES P. NICHOLSON, P.O. Box 402, Norris, Tenn. 37828.*

87. DECIDUOUS CLEARCUT. — Location: Georgia; Rabun Co.; Chattahoochee Nat'l Forest; 5 mi SE of Clayton; Tiger Quadrangle, USGS. **Continuity:** Established 1977. **Size:** 6.88 ha = 17 acres. **Description of Plot:** See *AB* 32:80-1 (1977). **Weather:** Cloudy and cool. **Coverage:** Apr. 29; May 7, 12, 19-20, 25, 28; June 2, 11, 17, 24; 0730-0930. Total man-hours: 17.5. **Census:** Rufous-sided Towhee, 12 (174, 71); Indigo Bunting, 3 (44, 18); Prairie Warbler, 3; Bobwhite, 1; Mourning Dove, 1; Carolina Chickadee, 1; Brown Thrasher, 1; Yellow-breasted Chat, 1; Cardinal, 1; Chipping Sparrow, 1. **Total:** 10 species; 25 territorial males or females (363/km², 147/100 acres). **Visitors:** Chimney Swift, Ruby-throated Hummingbird, Com. Flicker, Downy Woodpecker, Pileated Woodpecker, Great Crested Flycatcher, E. Phoebe, Com. Crow, Com. Raven, Tufted Titmouse, Brown-headed Nuthatch, Blue-gray Gnatcatcher, Chestnut-sided Warbler, Am. Goldfinch. There was a decrease of 4 breeding species from the previous census. — *LOUIS W. SCHWEIZER, 2573 Tilson Dr., SE, Atlanta, Ga. 30317.*

88. ASPEN CLEARCUT (6 yr). — Location: Minnesota; Itasca Co., Chippewa National Forest; NE ¼ of SE ¼, Sec. 3, T57N, R25W; 47°27′N, 93°30′W, Lawrence Lake West Quadrangle, USGS. **Continuity:** Established 1977; 2 intermittent years. **Size:** 11.5 ha = 28.5 acres. **Description of Plot:** See *AB* 32:79 (1977). Most saplings were 11-13 ft in height. **Coverage:** May 26, 30; June 8, 13, 22, 26; 0630-1030. Total man-hours: 13.5. **Census:** Chestnut-sided Warbler, 10 (87, 35); Mourning Warbler, 4 (35, 14); Rose-breasted Grosbeak, 3 (26, 11); White-throated Sparrow, 2.5; Song Sparrow, 2.5; Gray Catbird, 2; Golden-winged Warbler, 2; Nashville Warbler, 2; Alder Flycatcher, 1.5; Veery, 1.5; Com. Yellowthroat, 1; Am. Robin, 0.5; Brown Thrasher, 0.5; Black-billed Cuckoo, 1; Ruby-throated Hummingbird, +; Blue Jay, +; Black-capped Chickadee, +; Ovenbird, +; Brown-headed Cowbird, +. **Total:** 19 species; 34 territorial males (295/km², 119/100 acres). — *DONALD RAKSTAD and JOHN R. PROBST, North Central Forest Experiment Station, USDA Forest Service, St. Paul, Minn. 55108.*

89. MIXED WETLAND WITH TAMARACK AND ASPEN GROVES, SHRUBLAND AND FEN. — Location: Wisconsin; Waukesha Co., Falk Woods Nature Conservancy Area, 3 mi S of Waukesha, 2.5 mi S of intersection of County Highways A and F; 42°56′N, 88°14′W, Muskego Quadrangle, USGS. **Continuity:** Established 1977; 3 consecutive years. **Size:** 16.9 ha = 41.7 acres. **Description of Plot:** See *AB* 32:79-80 (1978). **Weather:** Normal temperatures; below normal rainfall. **Coverage:** May 27; June 6, 19, 22; July 1; 0615-1000. Total man-hours: 14. **Census:** Red-winged Blackbird, 15 (89, 36); Yellow Warbler, 12 (71, 29); Com. Yellowthroat, 9 (53, 22); Gray Catbird, 8 (47, 19); Swamp Sparrow, 8; Song Sparrow, 6.5 (39, 16); Am. Goldfinch, 6 (36, 14); Veery, 5 (30, 12); House Wren, 3.5 (21, 8); Willow Flycatcher, 3 (18, 7); Least Flycatcher, 3; Am. Robin, 3; Alder Flycatcher, 2; Cedar Waxwing, 2; Brown-headed Cowbird (female), 2; Cardinal, 2; Rose-breasted Grosbeak, 2; Mourning Dove, 1.5; Com. Flicker, 1.5; Mourning Warbler, 1.5; Blue Jay, 1; Black-capped Chickadee, 1; Red-eyed Vireo, 1; Blue-winged Warbler, 1; Chestnut-sided Warbler, 1; Indigo Bunting, 1; Rufous-sided Towhee, 1; Hairy Woodpecker, 0.5; Great Crested Flycatcher, 0.5; Com. Crow, 0.5; Wood Thrush, 0.5; Golden-winged Warbler, 0.5; N. Oriole, 0.5. **Total:** 33 species; 106.5 territorial males or females (631/km², 255/100 acres). **Visitors:** Black-billed Cuckoo, Downy Woodpecker, E. Phoebe, White-breasted Nuthatch, Savannah Sparrow. **Remarks:** Fledglings noted: Downy Woodpecker, Am. Robin. — *BOB ADAMS, JOHN BIELEFELDT, VERN AUNE (compiler), Benjamin F. Goss Bird Club, S. 13 W. 22167 Ridge Road, Waukesha, Wis. 53186.*

90. KENTUCKY BLUE GRASS PRAIRIE. — Location: North Dakota; Stutsman Co., NE quarter of Sect. 12, T142N, R68W; 47°8′N, 99°14′W, Goldwin Quadrangle, USGS. **Continuity:** Established 1972; 8 consecutive years. **Size:** 4.86 ha = 12 acres. **Description of Plot:** See *AB* 26:972 (1972). **Weather:** Spring arrived very late and phenological events averaged about 2 weeks later than usual. Temperatures in May were subnormal, with average extremes of 35° and 65°F. June temperatures were nearly normal (49-77°). Snow conditions during the 1978-79 winter were adequate and most wetlands on the Woodworth Station contained water. Precipitation, which totaled 1.58 in. in May and 4.64 in. in June, was sufficient to maintain most of the wetlands throughout the period. **Coverage:** May 28, 31; June 1, 4, 6, 13, 22; 8 trips, 0545-1140, CDT. Total man-hours: 3. **Census:** Blue-winged Teal, 2; Bobolink, 2; W. Meadowlark, 1; Red-winged Blackbird, 1; Brown-headed Cowbird, 1 (female); Savannah Sparrow, 0.5; Gadwall, +; Wilson's Phalarope, +; E. Kingbird, +. **Total:** 9 species; 7.5 territorial males or females (154/km², 63/100 acres). **Visitors:** Am. Coot, Com. Snipe, Willet, Marbled Godwit, Barn Swallow, Com. Yellowthroat, Am. Goldfinch. — *DOUGLAS H. JOHNSON and J. MICHAEL CALLOW, Northern Prairie Wildlife Research Center, Jamestown, N. D. 58401.*

BREEDING BIRDS OF SELECTED GRASSLANDS AND SHRUBLANDS IN THE NORTH DAKOTA BADLANDS

The following 5 census plots are located near Medora in Theodore Roosevelt Nat'l Park, along the Little Missouri River. This area is mostly unglaciated or only moderately affected, including scattered buttes, eroded sedementary bedrock and clay-scoria slopes and rolling upland grasslands. The plots sample the grasslands and shrublands, which are the predominant habitat types. Average annual precipitation is about 14 in. Average July temperature is 72°F; census temperatures ranged from 35-72°F. The weather was mostly dry, clear and calm. Until the park was established in 1947 this area was heavily grazed by cattle. Some of the plateau regions have been plowed. There were sawmills operating along the Little Missouri River and evidence of timber cuttings can be seen throughout the park. Currently about 250 buffalo and 46 feral horses graze the grasslands. This study was supported by Nat'l Park Service grants CX-1200-8-B030 and CX-1200-9-B037. — *R. B. HOPKINS, Biology Dept., Univ. of South Dakota, Vermillion, S. D. 57069.*

91. MIXED PRAIRIE I. — Location: North Dakota: Billings Co., SE quarter of Sec. 3, T140N, R101W, Theodore Roosevelt Nat'l Park (South Unit), USGS. **Continuity:** New.

From: AB 35(1):76;1981

105. DISTURBED OAK - HICKORY FOREST, PINE STAND, EDGE, AND POND.—Location: Ohio; Licking Co., Eden Township, Camp Falling Rock, 1.2 mi NNE of the intersection of County Road 210 and State Route 79; 40°11'N, 82°18.5'W, Newark Quadrangle, USGS. **Continuity:** Established 1937; 42 intermittent years. **Size:** 14.16 ha = about 35 acres. **Description of Plot:** See *Bird-Lore* 39:379-80 (1937). **Habitat Changes:** More than a normal loss of trees took place. Eight species of wind-blown trees and one which was cut were lost, ranging from 3 in. White Oak (*Quercus alba*) to a 4 ft. Tulip-tree (*Liriodendron tulipifera*). **Weather:** The severe spring storms which caused the windfall of trees damaged some early nests, such as the robin's and might have caused other disturbances in the nesting cycles. **Coverage:** June 7, 11. Total hours: 14. **Census:** Red-eyed Vireo, 8 (56, 23); Acadian Flycatcher, 7 (49, 20); Wood Thrush, 6 (42, 17); Am. Robin, 5 (35, 14); Scarlet Tanager, 5; Cerulean Warbler, 4 (28, 11); E. Wood Pewee, 3 (21, 9); House Wren, 3; Gray Catbird, 3; Kentucky Warbler, 3; Cardinal, 3; Red-bellied Woodpecker, 2; Downy Woodpecker, 2; Great Crested Flycatcher, 2; Tufted Titmouse, 2; White-breasted Nuthatch, 2; Yellow-throated Vireo, 2; Ovenbird, 2; Brown-headed Cowbird, 2; Chipping Sparrow, 2; Mourning Dove, 1; Yellow-billed Cuckoo, 1; Ruby-throated Hummingbird, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; E. Phoebe, 1; Blue Jay, 1; Com. Crow, 1; Carolina Chickadee, 1; Blue-gray Gnatcatcher, 1; Cedar Waxwing, 1; Warbling Vireo, 1; Louisiana Waterthrush, 1; Am. Redstart, 1; N. Oriole, 1; Rose-breasted Grosbeak, 1; Indigo Bunting, 1; Am. Goldfinch, 1; Song Sparrow, 1. **Total:** 39 species; 87 pairs, (614/km^2, 249/100 acres). The reduced man-hours of this census makes it less reliable than those prior to 1979.—*A.H. CLAUGUS, 228 S. Lake St., Carey, Ohio 43316.*

106. DECIDUOUS CLEARCUT (6 yr).—Location: Tennessee; Washington Co., Horse Cove Gap; about 4.5 mi S of Johnson City; 36°14'N, 82°22'W, Erwin Quadrangle, USGS. **Continuity:** Established 1975; 6 consecutive years. **Size:** 20.23 ha = 50 acres. **Description of Plot:** See *AB* 29:1117-8 (1975). Tree regrowth now averages about 12 ft high. **Weather:** Clear, very dry. **Coverage:** May 24-26, 31; June 1, 3-4, 8, 28; July 26; Aug. 16; 0530-1100, EDT. Total hours: 31. **Census:** Rufous-sided Towhee, 26 (128, 52); Yellow-breasted Chat, 16 (79, 32); Hooded Warbler, 13.5 (67, 27); Ruby-throated Hummingbird, 6 (30, 12); White-eyed Vireo, 6; Kentucky Warbler, 4 (20, 8); Cardinal, 4; Red-eyed Vireo, 3 (15, 6); Indigo Bunting, 3; Carolina Chickadee, 2; Am. Goldfinch, 2; Whip-poor-will, 1; Gray Catbird, 1; Blue-gray Gnatcatcher, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1; Sharp-shinned Hawk, +; Pileated Woodpecker, +; Downy Woodpecker, +; Yellow-throated Vireo, +; Black-and-white Warbler, +. **Total:** 21 species; 90.5 territorial males or females (447/km^2, 181/100 acres). **Remarks:** Total males for the last 6 years (33, 32, 53, 61, 79.5, 90.5) show how rapidly breeding populations are changing in this changing habitat. Four new species this year: Sharp-shinned Hawk, Whip-poor-will, Yellow-throated Vireo, and Worm-eating Warbler. A species showing a remarkable increase this year was the Rufous-sided Towhee (14 to 26) after a previous 5-year average of 9.2. Other notable increases include Hooded Warbler (7.5 to 13.5) and Yellow-breasted Chat (10 to 16). The Indigo Bunting population crashed this year (10 to 3) after a previous 5-year average of 9.6. A visiting Carolina Wren seen in July was the first observed since 1976 when this species had 5 territories. The nest of the Sharp-shinned Hawk was not found but was believed to have been just beyond the middle of the SE border. This hawk was heard calling from and seen going to the spot throughout the census. On July 26, two immatures were observed near the presumed nesting spot while two adults flew overhead.—*RICHARD LEWIS, Rt. 3, Box 5, Bristol, Tenn. 37620.*

107. DECIDUOUS CLEARCUT (2-yr.).—Location: Tennessee; Sullivan Co., Dogwood Bench; about 17 mi E of Bristol on Hwy 421; 32°30'N, 82°58'N, Shady Valley Quadrangle, USGS. **Continuity:** New. **Size:** 8.1 ha = 20 acres. **Description of Plot:** The area appears to have been clear cut in 1978. Except for about 20 scattered trees in the S corner, there are no standing trees on the plot. A dirt road forms the SE border. Vegetation consists mainly of stump sprouts. Shrub stems per acre, 27,140; ground cover 64%; estimated average shrub height 3 ft. Relative densities of stump sprouts and seedlings: Red Maple (*Acer rubrum*), 25%; *Sassafras albidum*, 25%; Sourwood (*Oxydendrum arboreum*), 15%; Am. Chestnut (*Castanea dentata*), 15%; Chestnut Oak (*Quercus prinus*), 10%. The main shrubs are Mountain Laurel (*Kalmia latifolia*) and Rosebay Rhododendron (*Rhododendron catawbiense*). **Edge:** Surrounded by mature hardwood forest. **Topography:** On the SE slope of a ridge. **Elevation:** 2800 ft. **Weather:** Clear, dry. **Coverage:** May 29-30; June 12, 14-15, 21; July 19; Aug. 9; 0540-0900. Total hours: 12. **Census:** Rufous-sided Towhee, 11 (136, 55); Indigo Bunting, 4 (49, 20); Gray Catbird, 1; Worm-eating Warbler, 1. **Total:** 4 species; 17 territorial males (210/km^2, 85/100 acres).—*RICHARD LEWIS, Rt. 3, Box 5, Bristol, Tenn. 37620.*

108. MIXED-MESOPHYTIC WOODS, FIELDS, AND BRUSH.—Location: Tennessee; Putnam Co., about 5 mi WNW of Monterey, in Barnes Hollow to NW of Lee Knob: 36°9'45"N, 85°22'W, Monterey Quadrangle, USGS. **Continuity:** Established 1977; 4 consecutive years. **Size:** 30 ha = 74 acres. **Description of Plot:** See *AB* 32:80 (1978) and 33:79 (1979). **Changes:** Lumbering from March to May affected about 10 ha N of plot and about 25 ha (or more) E of plot; bulldozing in April and May along the bottomland dirt road did some damage to adjacent vegetation; lumbering only immediately adjacent to NE border. In addition, about 20 trees over 6 in. dbh were cut. Weeds occupied most of the field cultivated in 1979. **Weather:** Drier than normal; summer hotter than normal, with drought conditions by mid-July that killed or injured many saplings, especially Tulip-trees (*Liriodendron*). Rain in late July eased the drought. Temperature extremes 0-39°C for the season; 5-25° during census. **Coverage:** Apr. 17, 20, 22, 24; May 1, 3-4, 11, 15, 21, 24, 26; June 1, 5, 7, 14-15, 22, 23; 0500-2030 hours, CDT. Total hours: 38+. **Census:** Red-eyed Vireo, 17 (57, 23); Prairie Warbler, 6.5 (22, 9); Yellow-breasted Chat, 6 (20, 8); Indigo Bunting, 5.5 (18, 7); Blue-gray Gnatcatcher, 5 (17, 7); White-eyed Vireo, 5; Field Sparrow, 5; Com. Yellowthroat, 4 (13, 5); Cardinal, 4; Acadian Flycatcher, 3 (10, 4); Rufous-sided Towhee, 3; Yellow-throated Vireo, 2.5; Yellow-billed Cuckoo, 2; Tufted Titmouse, 2; Wood Thrush, 2; Kentucky Warbler, 2; E. Phoebe, 1.5; Carolina Chickadee, 1.5; Cerulean Warbler, 1.5; Ovenbird, 1.5; Hooded Warbler, 1.5; Whip-poor-will, 1; Ruby-throated Hummingbird, 1; Downy Woodpecker, 1; Blue Jay, 1; White-breasted Nuthatch, 1; Black-and-white Warbler, 1; Worm-eating Warbler, 1; Brown-headed Cowbird, 1+; Scarlet Tanager, 1; Summer Tanager, 1+; Broad-winged Hawk, 0.5; Mourning Dove, 0.5; Screech Owl, 0.5; Pileated Woodpecker, 0.5; Red-bellied Woodpecker, 0.5; Hairy Woodpecker, 0.5; Blue Grosbeak, 0.5; Am. Goldfinch, 0.5; Bobwhite, +; E. Wood Pewee, +. **Total:** 41 species; 96 territorial males or females (321/km^2, 130/100 acres). **Visitors:** Turkey Vulture, Red-tailed Hawk, Chimney Swift, Barn Swallow, Purple Martin, Com. Crow, Gray Catbird, Brown Thrasher, Blue-winged Warbler, Red-winged Blackbird, Chipping Sparrow. **Remarks:** Active nests located: E. Phoebe, (1). Blue-gray Gnatcatcher (1). Declines in species such as Acadian Flycatcher, Blue-gray Gnatcatcher, Red-eyed Vireo, Kentucky Warbler, and Indigo Bunting so far appear balanced by gains in other species as Prairie Warbler, Com. Yellowthroat, Yellow-breasted Chat and Field Sparrow. The nearby lumbering may have affected Black-and-white and Cerulean warblers, which were known to occur E of the plot in years past; these species appear territorial but probably did not breed.—*RICHARD W. SIMMERS, JR., Route 6, Box 170, Cookeville, Tenn. 38501.*

109. DECIDUOUS CLEARCUT.—Location: Georgia; Rabun Co., Chattahoochee Nat'l Forest, 5 mi SE of Clayton; 34°48'N, 83°24'W, Tiger Quadrangle, USGS. **Continuity:** Established 1977; 4 consecutive years. **Size:** 6.88 ha = 17 acres. **Description of Plot:** See *AB* 32:80-1 (1978). **Weather:** Sunny and cool. **Coverage:** May 5-8, 11, 19, 26; 0700-1000. Total hours: 10. **Census:** Rufous-sided Towhee, 16 (233, 94); Indigo Bunting, 3 (44, 18); Prairie Warbler, 3; Carolina Chickadee, 1; Carolina Wren, 1; Brown Thrasher, 1; Yellow-breasted Chat, 1; Cardinal, 1; Chipping Sparrow, 1. **Total:** 9 species; 28 territorial males (407/km^2, 165/100 acres). **Visitors:** Great Crested Flycatcher, E. Phoebe, Blue-gray Gnatcatcher, Red-eyed Vireo, Hooded Warbler, Pine Warbler, Scarlet Tanager, Am. Goldfinch. **Nest found:** Rufous-sided Towhee.—*LOUIS W. SCHWEIZER, 2573 Tilson Dr. SE, Atlanta, Ga. 30317.*

110. IMPROVED PASTURE AND OAK-PINE FOREST.—Location: Oklahoma; Delaware Co., 3.5 mi S of Jay; 36°22'N, 94°48'W, Jay Quadrangle, USGS. **Continuity:** Established 1979. **Size:** 9.11 ha = 22.5 acres. **Description of Plot:** See *AB* 34:70-71 (1980). **Weather:** See Census 54. **Coverage:** May 3, 6, 13; June 14, 16, 28; July 5;

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Total: 44 species; 94 territorial males (1161/km^2, 470/100 acres). **Visitors:** Am. Woodcock, Spotted Sandpiper, Great Horned Owl, Com. Crow, Brown Thrasher, Blue-gray Gnatcatcher, E. Meadowlark. **Remarks:** Nests located (33): Starling, 6; House Wren, 3; Gray Catbird, 3; Am. Robin, 3; Com. Grackle, 3; Yellow Warbler, 2; House Sparrow, 2; Mallard, 1; Com. Flicker, 1; E. Kingbird, 1; E. Phoebe, 1; Blue Jay, 1; White-breasted Nuthatch, 1; Red-winged Blackbird, 1; Cardinal, 1; Rose-breasted Grosbeak, 1; Chipping Sparrow, 1; Song Sparrow, 1. Species density and diversity were similar to last year. Although their rank changed, Am. Robin, Starling and Song Sparrow continued as the 3 most abundant nesters. The next 4, the same as last year, were House Wren, Gray Catbird, Yellow Warbler, and Com. Grackle, although their rank changed. Two species (Am. Woodcock and E. Meadowlark) that were territorial last year were visitors; Least Flycatcher, territorial this year, was a visitor last year. Black-billed Cuckoo, Ruby-throated Hummingbird, and Yellow-bellied Sapsucker were not present this year. Wood Thrush, Bobolink, and Field Sparrow were new.—*DONALD B. SNYDER, Dept. of Biology, Edinboro State College, Edinboro, PA 16444.*

81. OLD FIELD–MEADOW AND PRIMARY DECIDUOUS THICKETS. — Location: Pennsylvania; Butler Co., Buffalo Township, 1 mi S of intersection of State Rte. 228 and Kepple Rd.; 40°44′N, 79°42′W, Freeport Quadrangle, USGS. **Continuity:** Established 1974; 7 intermittent years. **Size:** 10.1 ha = 25 acres. **Description of Plot:** See *AB* 28:1027-1028 (1974). **Weather:** Temperatures 44-70°F. June was seasonably wet; early July had record cold temperatures; August, average precipitation. **Coverage:** June 3-6, 8, 11-13, 18-19, 24, 27; July 2, 22; 0500-0700, 1800-1930. Total man-hours: 30. **Census:** Rufous-sided Towhee, 6 (59, 24); Field Sparrow, 5.5 (54, 22); Gray Catbird, 5 (49, 20); Com. Yellowthroat, 5; Blue-winged Warbler, 4 (40, 16); Red-eyed Vireo, 3.5 (35, 14); Cardinal, 3 (30, 12); Indigo Bunting, 3; Song Sparrow, 3; Black-capped Chickadee, 1.5; Wood Thrush, 1.5; Cedar Waxwing, 1.5; Ruffed Grouse, 1; Yellow-billed Cuckoo, 1; Com. Crow, 1; White-eyed Vireo, 1; Prairie Warbler, 1; Yellow-breasted Chat, 1; Ruby-throated Hummingbird, 0.5; Hairy Woodpecker, 0.5; Hooded Warbler, 0.5; Pileated Woodpecker, +; Blue Jay, +; Tufted Titmouse, +; Ovenbird, +; Am. Goldfinch, +; Chipping Sparrow, +. **Total:** 27 species; 50 territorial males (494/km^2, 200/100 acres). **Visitors:** Great Blue Heron, Mallard, Turkey Vulture, Cooper's Hawk, Red-tailed Hawk, Broad-winged Hawk, Killdeer, Solitary Sandpiper, Spotted Sandpiper, Mourning Dove, Screech Owl, Great Horned Owl, Chimney Swift, Belted Kingfisher, Com. Flicker, Downy Woodpecker, Great Crested Flycatcher, E. Wood Pewee, Barn Swallow, White-breasted Nuthatch, House Wren, Am. Robin, E. Bluebird, Blue-gray Gnatcatcher, Yellow-throated Vireo, Solitary Vireo, Golden-winged Warbler, Kentucky Warbler, N. Oriole, Com. Grackle, Scarlet Tanager, Rose-breasted Grosbeak, Purple Finch, Grasshopper Sparrow. **Remarks:** Nests found: Ruffed Grouse 1, Yellow-billed Cuckoo 1, Hairy Woodpecker 1, Com. Crow 1, Prairie Warbler 1, Com. Yellowthroat 1, Indigo Bunting 1.—*MIKE STARKER, 1134 Countryside Dr., Harrisburg, PA 17110.*

82. STUNTED SPRUCE–SHRUB COMMUNITY. — Location: West Virginia; Pendleton Co.; 3 mi NE of Circleville; plot begins 38°42′10″N, 79°37′09″W, and extends NNE along Huckleberry Trail, following the crest of Spruce Mountain, Spruce Knob Quadrangle, USGS. **Continuity:** New. **Size:** 6.07 ha = 15 acres (rectangular, 110 × 660 yds measured longitudinally and estimated laterally). **Description of Plot:** The relatively flat ridge with thin soil and areas of exposed boulders of resistant Pottsville sandstone is characteristic. The vegetation at this altitude is stressed by harsh winter weather and contains areas of stunted spruce interspersed with areas of shrubs. The dominant tree is Red Spruce *(Picea rubens)* covering 56% of plot. Most prominent shrubs are *Menziesia pilosa* and Mountain Holly *(Nemopanthus mucranata)* which cover 44% of the area. The ground cover is *Vaccinium* sp. A quantitative survey of the trees gave the following results: Trees 3-in. in diameter and over, based on 5 circular samples, 246/acre; total basal area 53.2 ft^2/acre. Species comprising 98% of the total number of trees: Red Spruce 234, 100, 100, 100. Trees by diameter size class: A (3-6 in.) 138, 56, 13.8, 26; B (6-9 in.) 94, 38, 28, 53; C (9-15 in.) 14, 5.2, 11.2, 21. Average tree height 28.9 ft (range 21-34). **Edge:** Similar habitat surrounds the plot. **Topography:** Level at 4800 ft. **Weather:** Cool, clear, sometimes breezy. **Coverage:** June 17-20; between dawn and 0800 or 1800-2030 hrs. Total party-hours: 30. **Census:** Dark-eyed Junco, 10 (165, 67); Magnolia Warbler, 6 (99, 40); Hermit Thrush, 4 (66, 27); Rufous-sided Towhee, 3 (49, 20); Yellow-rumped Warbler, 2.5; Com. Yellowthroat, 2; Am. Robin, +; Purple Finch, +. **Total:** 8 species; 27.5 territorial males (453/km^2, 183/100 acres). **Visitors:** Com. Nighthawk, Blue Jay, Swainson's Thrush, Am. Goldfinch. **Remarks:** The size of the spruce trees is quite comparable to the size of those on Gaudineer Knob, W. Va. in a census made 34 years ago, although that area had a far greater density of trees per unit area. In comparing the 2 censuses one notes particularly the much lower number of Magnolia Warblers on this area, a condition possibly related to the tree density. The Yellow-rumped Warblers have only recently established breeding populations this far south in the Appalachians. Census Participants: L. Chandler, R. DeGarmo, C. Ellis, E. Hutton, N. Laitsch, A. Pyle, Z. Stewart and L. Wilson.—*BILL SMITH (compiler) and GEORGE HALL, Brooks Bird Club, 707 Warwood Ave., Wheeling, WV 26003.*

83. DECIDUOUS CLEARCUT. — Location: Virginia, Augusta Co., 2.25 mi NNW of Stokesville; 38°23′N, 79°9′45″W, Reddish Knob Quadrangle, USGS. **Continuity:** New. **Size:** 6.07 ha = 15.0 acres (rectangular, 110 × 660 yards, measured longitudinally and estimated laterally). **Description of Plot:** This area on the George Washington Nat'l Forest was clearcut in late 1977. Average height of stump sprouts is now 9 ft, with Red Maple *(Acer rubrum)*, Chestnut Oak *(Quercus prinus)*, and Red Oak *(Q. rubra)* predominating. Most prominent in the understory are Red Maple, Witch Hazel *(Hamamelis virginiana)*, and Red Oak. The ground cover is primarily Blueberry *(Vaccinium vacillans)* and Hay-scented Fern *(Dennstaedtia punctilobula)*. Shrub stems/acre 3575; ground cover 70.4%; canopy cover 0%. **Edge:** Similar but uncut stands (average age 70 years) surround this 28 acre clearcut on all sides. **Topography:** A moderate E-facing slope at the base of Shenandoah Mountain. **Elevation:** 1840 ft. **Weather:** Cool, humid, with rising morning fog on most censuses. **Coverage:** May 21-22, 25-26, 28; June 1, 3, 6, 12; between dawn and 0930 hrs. Total party-hours: 11.25. **Census:** Prairie Warbler, 6.5 (107, 43); Indigo Bunting, 6 (99, 40); Rufous-sided Towhee, 5 (82, 33); Chipping Sparrow, 2; Field Sparrow, 1.5; Black-capped Chickadee, +; Gray Catbird, +. **Total:** 7 species; 21 territorial males (346/km^2, 140/100 acres). **Visitors:** Chimney Swift, Ruby-throated Hummingbird, Com. Flicker, Com. Raven, Orange-crowned Warbler, Brown-headed Cowbird, Am. Goldfinch. **Remarks:** Small flocks of goldfinches fed regularly on serviceberry trees left standing in the clearcut. A Chipping Sparrow nest was found. Many thanks to Max Carpenter, Kathleen Finnegan, Lenny Leta, Mary Smith and Charles Ziegenfus for helping with the census and to Elwood Fisher and Clair Mellinger for helping with the vegetation survey.—*ELLEN J. GOETZ, U.S. Forest Service, Harrisonburg, VA 22801.*

84. ABANDONED PASTURE SCRUBLAND. — Location: Ontario; Ottawa, Innis Point; 45°20′N, 75°54′W. **Continuity:** New. **Size:** 9.0 ha = 22.24 acres (300m square paced). **Description of Plot:** Several vegetation types exist in the plot; 49% is covered by semi-open shrub area, 17% by mixed wood with a thick understory, 11.5% by coniferous wood, 10.5% by a young deciduous wood, 10.5% by an open area of Quaking Aspen and White Ash, 1% by a shallow sedge-filled pond, and 0.5% was part of the Ottawa River shoreline. The semi-open shrub area consists mostly of open grassland and Poison Ivy *(Rhus radicans)* with scattered thick clumps of Prickly Ash *(Xanthoxylum americanum)*, Serviceberry (*Amelanchier* spp.), Nannyberry *(Viburnum lentago)*, and Choke Cherry *(Prunus virginiana)*, 3-7 ft in heigh.. Occasional scattered Bur Oak *(Quercus macrocarpa)* and White Cedar *(Thuja occidentalis)*, 10-30 ft tall, grow in these areas. The dominant trees in the mixed wood are Bur Oak, Quaking Aspen *(Populus tremuloides)*, White Cedar and White Spruce *(Picea glauca)*, 25–40 ft high. The understory is made up almost exclusively of Nannyberry, 4-8 ft high, with occasional Choke Cherry, Buckthorn (*Rhamnus* spp.) and Honeysuckle (*Lonicera* spp.) with little or no ground cover. The patches of coniferous wood are basically White Cedar, 30–40 ft in height, with occasional White Spruce and White Pine *(Pinus strobus)*. Undergrowth is sparse and restricted to small clearings, 8 ft in diameter, where Quaking Aspen, Serviceberry and Prickly Ash saplings grow. Ironwood *(Ostrya virginiana)*, 15-25 ft in height, is the dominant species in the deciduous wood, with occasional Red Oak *(Q. rubra)*, Bur Oak and Basswood *(Tilia ameri-*

From: Dickson & Segelquist, 1979

Table 2. Territorial male birds per km² in pine and pine-hardwood stands.*

Species	Small sapling		Sapling		Pole		Sawtimber	
	Pine	Pine-hdwd.	Pine	Pine hdwd.	Pine	Pine hdwd.	Pine	Pine hdwd.
Bobwhite	10			10				
Mourning dove		10						10
Yellow-billed cuckoo						10	10	10
Pileated woodpecker		10						
Red-bellied woodpecker		10					10	10
Red-headed woodpecker					10		10	
Downy woodpecker		10						
Great crested flycatcher		10			10			
Acadian flycatcher							5	10
Eastern wood pewee					10		10	5
Blue jay		10	10		5		10	20
Carolina chickadee		20	10		10	25	15	10
Tufted titmouse				30	10	20	50	40
Brown-headed nuthatch		10			30		10	
Carolina wren	21	30		50		45	45	40
Mockingbird	16							
Blue-gray gnatcatcher							10	20
White-eyed vireo	21	80		40		55	20	5
Red-eyed vireo						30	15	40
Black-and-white warbler				10		30	20	25
Pine warbler				20	55	35	50	20
Prairie warbler	21	25						
Worm-eating warbler								30
Common yellowthroat	42	10						
Kentucky warbler				10		10	10	15
Hooded warbler								10
Yellow-breasted chat	73	85		45				
Orchard oriole	10							
Summer tanager							15	
Cardinal	26	40	5	40		45	40	50
Blue grosbeak	31							
Indigo bunting	21			30			20	
Painted bunting	21							
Chipping sparrow					20			
Field sparrow				10				
Total	313	360	25	295	160	305	375	370

* Bird densities on the 10-ha study areas were converted to populations per 100 ha (1 km²) to facilitate comparisons. Scientific names are in Appendix Table 1.

lations had very little herbaceous or hardwood vegetation and the lowest FHD.

The small-sapling pine and pine-hardwood stands had dense vegetation near the ground and relatively high bird density and diversity. Although bird populations generally increase with advance of vegetative succession (Johnston and Odum 1956, Shugart and James 1973), lesser population peaks have been noted in early bushy stages of succession (Odum 1950, Johnston and Odum 1956, Shugart and James 1973). The pine-hardwood small-sapling stand contained a few remnant snags, and was taller and had more hardwood stems than the pine stand. Apparently this was more attractive to the Picids, white-eyed vireos, and cardinals, but less attractive to the other

APPENDIX C OF THE HABITAT QUALITY ASSESSMENT
BOTTOMLAND FOREST CENSUSES

From: AB 27(6):974;1973
(Taken from Dickson, 1978)

Table 2.—Territorial male birds per km^2 in three mature bottomland hardwood stands in Louisiana and East Texas.1/

1975 No. 41

1974 No. 48

Species	Stand		
	Tupelo swamp (La.)	Oak-gum (La.)	Oak-gum (Tx.)
Wood Duck	20		
Yellow-crowned Night Heron	20		
Purple Gallinule	10		
Yellow-billed Cuckoo	20	86	60
Chimney Swift	40		
Pileated Woodpecker		12	4
Red-bellied Woodpecker	80	12	16
Ruby-throated Hummingbird			16
Downy Woodpecker	80		32
Great Crested Flycatcher	190	6	28
Eastern Kingbird	10		
Acadian Flycatcher	140	62	224
Eastern Wood Pewee			4
Blue Jay	30		
Carolina Chickadee	80		12
Tufted Titmouse	20	80	64
White-breasted Nuthatch			8
Carolina Wren	80	148	64
Wood Thrush		6	
Blue-gray Gnatcatcher			48
Starling	40		
White-eyed Vireo		136	4
Yellow-throated Vireo		31	12
Red-eyed Vireo	10	25	92
Black-and-White Warbler			4
Parula Warbler	110		
Yellow-throated Warbler			12
American Redstart			4
Swainson's Warbler		25	

From: AB 27(6):974;1973

(Taken from Dickson, 1978) (Cont'd)

Table 2.--Continued

Species	Stand		
	Tupelo swamp (La.)	Oak-gum (La.)	Oak-gum (Tx.)
Prothonotary Warbler	200		64
Kentucky Warbler		12	
Hooded Warbler		12	
Red-winged Blackbird	90		
Common Grackle	70		
Summer Tanager	20		12
Northern Oriole	40		
Cardinal	80	93	80
Rufous-sided Towhee		6	

1/ Data from breeding bird censuses published in American Birds: Tupelo swamp (La.) (Ortego and Noble 1974), Oak-gum (La.) (Dickson 1973), Oak-gum (Tx.) (Hightower et al. 1974).

bird density and number of bird species were consistently lower in unthinned cottonwood plantations than in natural stands. On Huntington Point in the thinned plantation, the number of breeding bird species was similar to that in the natural stand, but bird density was lower. Cavity nesters such as the larger woodpeckers, the Great Crested Flycatcher, and the Prothonotary Warbler avoided the thinned and unthinned plantations, as did some birds, such as Hooded and Kentucky Warblers, that are associated with hardwood midstory (Dickson and Noble in press). Although the number of bird species was lower in the plantations than in the natural stands, the investigators thought that number of bird species in the entire area was probably increased because some species such as Red-winged Blackbirds, Yellowthroats, Yellow-breasted Chats, Norther and Orchard Orioles, Rufous-sided Towhees, and Warbling Vireos were commonly found in plantations but not in natural stands.

MANAGING BIRD HABITAT IN THE BOTTOMLAND HARDWOODS

The main threat to birds that inhabit bottomland hardwoods is the conversion of forests to agricultural land and reservoirs. Thus, the first management priority should be to keep bottomlands in hardwoods. Birds such as Prothonotary and Parula Warblers, which have specific habitat requirements and are associated with bottomland hardwoods will decrease in proportion to their dwindling habitat.

Land managers should maintain a diversity of tree species and age classes. Multiple objectives of bird and timber management can be met through harvesting by single tree selection, group selection, or small clearcuts (e.g., < 40 ha). Interspersion of forest stands with non-forested land such as crops should increase bird diversity.

Some natural mature stands (> 100 years old) should be maintained. Some birds of the bottomlands thrive in the canopy or shaded understory of mature stands. Decayed wood is abundant in natural mature stands but is being eliminated by intensive timber management. Many birds nest and feed in decayed wood. For nest building woodpeckers depend on trees infected with heart rots (Conner et al. 1976). Many other secondary cavity nesters use woodpecker excavations for nests (Balda 1975).

Although diversity of habitat should be used as a general guideline, some large mature stands (> 1000 ha) and corridors of mature trees between stands should be maintained. Such corridors should insure genetic variability by maintaining gene flow between bird populations that might otherwise become isolated.

From: AB 29(6):1097-98;1975

Quadrangle, USGS. **Continuity**: Established 1974 (1973); 3 consecutive years. **Size**: 6.1 ha = 15 acres (1045 x 625 ft rectangle; compass, transient, steel tape). **Description of Plot**: See *AB* 28: 1009-1010, 1974. **Weather**: Temperature averaged about 5° above last year's 55°F during May. Most mornings were overcast with low wind. **Coverage**: May 5-6, 8-9, 13, 16, 18, 20-21, 25; June 21, 29. Trips mostly 0600 - 0900; two evening trips. Total: 25 man-hours. **Census**: Acadian Flycatcher, 11.5 (189, 77); Blue-gray Gnatcatcher, 9.5 (156, 63); Red-eyed Vireo, 9 (148, 60); Cardinal, 9; Cerulean Warbler, 7 (115, 47); Tufted Titmouse, 6 (99, 40); Brown-headed Cowbird (female), 6; Ovenbird, 5 (82, 33); Red-headed Woodpecker, 4 (66, 27); E. Wood Pewee 4; Carolina Wren, 4; Gray Catbird, 3.5 (58, 23); Kentucky Warbler, 3.5; Com. Flicker, 3 (49, 20); Red-bellied Woodpecker, 3; Carolina Chickadee, 3; Hairy Woodpecker, 2.5; Great Crested Flycatcher, 2.5; Ruby-throated Hummingbird, 2; Downy Woodpecker, 2; Wood Thrush, 2; Mourning Dove, 1; Louisiana Waterthrush, 1; Rufous-sided Towhee, 1; Great Horned Owl, 0.5; Barred Owl, 0.5, Pileated Woodpecker, 0.5; White-breasted Nuthatch, 0.5; House Wren, 0.5; Indigo Bunting, +. **Total**: 30 breeding species; 108 territorial males or females (1779/km^2, 720/100 acres). **Remarks**: Fewer species are recorded this year, but with a corresponding increase in the total number of territorial males. With the exception of Scarlet Tanager and Yellow-throated Vireo, the missing species were breeding in adjacent areas. The number of cowbirds showed a 6-fold increase which was reflected in the parasitism of 4 out of 5 Cardinal nests. Nests were found for all Picidae. I thank the Ohio Dept. of Natural Resources for permission to make this study. — SALLY WATERHOUSE, *Miami Univ., Dept. of Zoology, Oxford, Ohio, 45056.*

40. MIXED DECIDUOUS FOREST. — Location: Tennessee; Hawkins Co., 3 miles E of Surgoinsville; 36°28'N, 82°49'W, Stony Point Quadrangle, USGS. **Continuity**: New. **Size**: 20 ha = 49.5 acres (irregular, surveyed). **Description of Plot**: Selective cutting of timber trees has occurred and much of the understory and ground cover has been destroyed by grazing. Reproduction of many species of trees is not occurring at this time and has not been significant during recent years. A quantitative analysis of the vegetation yielded the following: Trees, 3-inches diameter and over, based on five 0.1-acre circular samples, 234/acre; total basal area 146 ft^2/acre. Species comprising 90% of the total number of trees (figures after each give number of trees/acre, relative density (%), relative dominance, frequency, in that sequence): Am. Beech (*Fagus grandifolia*), 68, 29, 42, 80; White Oak (*Quercus alba*), 32, 14, 13, 40; Dead trees, 26, 11, 3, 60; Scrub Pine (*Pinus virginiana*), 22, 9, 9, 20; E. Red Cedar (*Juniperus virginiana*), 20, 9, 2, 20; Sourwood (*Oxydendrum arboreum*), 14, 6, 1, 80; Mockernut Hickory (*Carya tomentosa*), 10, 4, 5, 60; Black Oak (*Q. velutina*), 8, 3, 2, 60; Green Ash (*Fraxinus pennsylvanica*), 6, 3, 6, 40. Trees by diameter size class (figures after each class give number of trees/acre, relative density (%), basal area in ft^2/acre, relative dominance): A (3-6 in.) 92, 39, 9.2, 6.3; B (6-9 in.) 44, 19, 13.2, 9; C (9-15 in.) 64, 27, 51.2, 35; D (15-21 in.) 28, 12, 50.4, 34; E (21-27 in.) 4, 1.7, 12.4, 8.5; F (27-33 in.) 2, 0.9, 9.8, 6.7. Shrub stems/acre, 990; ground cover, 11% canopy, 93% average canopy height, 60 ft (range 45-70). **Edge**: Bordered by similar forest except for two small sections that are within 50 ft of open fields. **Topography**: Hilly, with some steep slopes. **Elevation**: 1150 - 1295 ft. **Weather**: Rainfall in the area totaled .41 in. during the first half of June, but the monthly total for May was 8.29 in. **Coverage**: June 6-15; 0600 to 0830. Total man-hours: 28. **Census**: Cardinal, 22 (110, 44); Carolina Wren, 12 (60, 24); Tufted Titmouse, 10.5 (52, 21); Red-eyed Vireo, 10 (50, 20); Yellow-billed Cuckoo, 7 (35, 14); Rufous-sided Towhee, 6.5 (32, 13); Carolina Chickadee, 6 (30, 12); Blue Jay, 4.5 (22, 9); Downy Woodpecker, 4 (20, 8); Great Crested Flycatcher, 3.5 (17, 7); Blue-gray Gnatcatcher, 2; Am. Robin, 2; Brown-headed Cowbird, 2; Indigo Bunting, 2; Red-bellied Woodpecker, 1.5; Wood Thrush, 1.5; Summer Tanager, 1.5; Screech Owl, 1; Great Horned Owl, 1; Pileated Woodpecker, 1; Starling 1; Yellow-throated Vireo, 1; Kentucky Warbler, 1; Scarlet Tanager, 1; Field Sparrow, 1; Com. Flicker, 0.5; Brown Thrasher, 0.5; White-eyed Vireo, 0.5. **Total**: 27 species; 106 territorial males (529/km^2, 214/100 acres). **Remarks**: 11 nests were located: Yellow-billed Cuckoo, 1; Pileated Woodpecker, 1; Red-bellied Woodpecker, 1; Blue Jay, 1; Carolina Wren, 1; Starling, 1; Cardinal, 4; Rufous-sided Towhee, 1. The population of Yellow-billed Cuckoos seemed high in comparison to other published censuses. [Perhaps this was because this census was conducted during the peak of their migration. See census No. 19. — ED.] — ALAN B. SMITH, *7017 Northshore Dr., Knoxville, Tenn. 37919.*

41. TUPELO SWAMP. — Location: Louisiana; Evangeline Parish; Miller's Lake; 15.9 km NW of Ville Platte. The west boundary is 2.1 km NE of the south boat landing; 30°45'N, 90°20'W. Section 53 and 54, T3S, R1E, Ville Platte, La. Quadrangle, USGS. **Continuity**: New. **Size**: 10 ha = 24.7 acres (as measured from aerial photograph). **Description of Plot**: Located within a 1300+ ha freshwater lake. A quantitative survey based on 50 randomly located 0.1 ha (radius = 5.6 m) circular plots gave the following results: 1046 trees/ha with a dbh 7.5 cm and over: Basal areas, 45.4 m^2/ha. Overstory species are Tupelo (*Nyssa aquatica*), 99.8%; and Carolina Ash (*Fraxinus caroliniana*), 0.2%. There are 980 shrubs/ha with a total basal area of 0.6 m^2/ha as determined by individuals with a dbh between 1.3 and 7.5 cm within 50 randomly located .001 ha (radius = 1.8 m) circular plots. Understory species are Com. Buttonbush (*Cephalanthus occidentalis*), 70.; and Carolina Ash, 29.6%. The ground cover consists of Floating Bladderwort (*Utricularia inflata*), Fanwort (*Cabomba caroliniana*), Water-lettuce (*Pistia stratiotes*), Water Hyacinth (*Eichhornia crassipes*), and duckweed (*Lemnaceae*). **Topography**: Flat, elevation 22.9 m. **Edge**: Part of a 20-ha Tupelo swamp. The west boundary is adjacent to open water. The other boundaries are within the swamp. The average water depth is 1.1 meters. **Weather**: During the count period, the temperature ranged from 20 to 35°C. During counts, the average temperature was 22°C, cloud cover averaged

15%, and the wind averaged 8 km/hr. Rainfall during the period was 8.9 cm. **Coverage**: May 19, 27; June 4, 12, 16-17; between 0640 and 0845, averaging 85 minutes each. **Census**: Prothonotary Warbler, 20 (200, 81); Great Crested Flycatcher, 19 (190, 77); Acadian Flycatcher, 14 (140, 57); N. Parula 11 (110, 45); Red-winged Blackbird, 9 (90, 36); Red-bellied Woodpecker, 8 (80, 32); Downy Woodpecker, 8; Carolina Chickadee, 8; Carolina Wren, 8; Cardinal, 8; Com. Grackle, 7 (70, 28); Chimney Swift, 4 (40, 16); Starling, 4; N. Oriole, 4; Brown-headed Cowbird, 4; Blue Jay, 3 (30, 12); Yellow-crowned Night Heron, 2; Wood Duck, 2; Yellow-billed Cuckoo, 2; Tufted Titmouse, 2; Summer Tanager, 2; Purple Gallinule, 1; E. Kingbird, 1; Red-eyed Vireo, 1; Com. Gallinule, +; Hairy Woodpecker, +. **Total**: 26 species; 154 territorial males (1540/km², 623/100 acres). — BRENT ORTEGO and ROBERT E. NOBLE, *School of Forestry and Wildlife Management, Louisiana State Univ., Baton Rouge, La. 70803.*

42. OAK—HICKORY FOREST. — Location: Kansas; Jefferson Co., on the University of Kansas' Rockefeller Experimental Tract and the Nelson Environmental Studies Area. Predominantly on the SW ¼, NW ¼, Section 3, T-11S, R-20E, Midland Quadrangle, USGS. **Continuity**: Established 1974. ***Size***: 9.7 ha = 24 acres (rectangular 359.7 x 270.1 meters). **Description of Plot**: See *AB* 28: 1010-1011, 1974. **Weather**: The mean temperature during census hours was 63.4°F (range 51-78°). Precipitation for the census period was only slightly above average. **Coverage**: May 28, 30-31; June 9-10, 13, 17, 20; between 0715 and 0930 CDT. Total man-hours: 18. **Census**: Blue Jay, 5 (51, 21); E. Wood Pewee, 5; Mourning Dove, 4 (41, 17); Black-capped Chickadee, 4; Tufted Titmouse, 4; White-breasted Nuthatch, 3 (31, 13); Wood Thrush, 3; Kentucky Warbler, 3; Rose-breasted Grosbeak, 3; Downy Woodpecker, 2.5; Yellow-billed Cuckoo, 2; Red-bellied Woodpecker, 2; Red-headed Woodpecker, 2; N. Oriole, 2; Brown-headed Cowbird, 2; Am. Woodcock, 1; House Wren, 1; Carolina Wren, 1; Red-eyed Vireo, 1; Rufous-sided Towhee, 1; Red-tailed Hawk, +; Am. Robin, +. **Total**: 22 species; 52.5 territorial males (541/km², 219/100 acres). **Remarks**: Nests found: Mourning Dove 3, Blue Jay 2, E. Wood Pewee 2, woodcock 1, Red-headed Woodpecker 1, Wood Thrush 1, N. Oriole 1, Rose-breasted Grosbeak 1. Two fewer species were recorded on the area this year compared to 1974 and the number of territorial males increased slightly. Hairy Woodpeckers, Blue-gray Gnatcatchers, Summer Tanagers and N. Parulas were conspicuously absent. The most noticeable change was a decrease in the Cardinal population from five to two pairs. Red-headed Woodpeckers, N. Orioles, Kentucky Warblers and Rose-breasted Grosbeaks showed increases while Yellow-billed Cuckoos, Am. Robins and Wood Thrushes were less numerous. No noticeable changes in habitat were observed that might account for these fluctuations. — CALVIN L. CINK, *Museum of Natural History, Univ. of Kansas, Lawrence, Kans. 66045.*

43. VIRGIN SCRUB OAK FOOTHILLS. — Location: Oklahoma; Osage Co.; from intersection of U.S. 60 and Okla. 123, 5 miles W and 2.5 miles SW; 96°06'N, 36°44'W, Woolaroc Quadrangle, 7.5 min. series USGA, SW one-fourth of SE quarter of section 10-26-11. **Continuity**: New. **Size**: 16.2 ha — 40 acres (square, original survey three sides, fourth side compassed.) **Description of Plot**: Principally Black Jack and Post Oak trees and shrubs that have never been cut, on sandy loam containing sandstone outcroppings (about 7%). Southwest edge includes a steep 15 to 30 ft canyon wall and about 5 acres of sloping canyon floor. A two-tenths acre artificial pond and a 200-yard jeep trail are the only disturbed areas. Plot includes 4 drainage gullies into the canyon. Following is a survey of the vegetation using 10 tenth-acre circles: Trees 3-inches in diameter and over, 65/acre; total basal area, 35.9 ft²/acre. Numbers indicate trees per acre, relative density, dominance and frequency: Black Jack Oak (*Quercus marilandica*) 43, 66, 35, 80; Post Oak (Q. (*Q. stellata*) 14, 22, 50, 80; dead trees 6, 9, 12, 40; Black Walnut (*Juglans nigra*) 1, 2, 1, 10; hickory (*Carya* sp.) 1, 2, 2, 10. Trees by diameter size class (figures give number of trees/acre, relative density, basal area in sq. ft/acre, relative dominance): A (3-6 in.) 28, 43, 2.8, 8; B (6-9 in.) 11, 17, 3.3, 9; C (9-15 in.) 17, 26, 13.6, 38; D (15-21 in.) 9, 14, 16.2, 45. Shrub stems/acre (predominantly oak sprouts) 28,650; ground cover 93%; canopy cover 19%; average canopy height 24 ft (range 15-35). Trees are stunted because of soil conditions, periodic wind storms and fire. Shadbush (*Amelanchier arborea*), Chittim-wood (*Bumelia langinosa*), Black Oak (*Q. velutina*) and Sumac (*Rhus glabra*) were present in and near the canyon. Bluestems (*Andropogon* sp.) and Wild Alfalfa (*Psoralea tenuiflora*) were dominant in the ground cover. **Edge**: Bordered on all sides by similar habitat. **Topography**: 80% is ridge and gentle 3-15% slopes toward canyon. Canyon wall is near vertical. **Elevation**: 800 - 940 ft. **Weather**: Cool and very wet. **Coverage**: April 10, 16, 24, 28; May 6, 15, 22, 26; June 6; between dawn and 1045 hours except one trip 1730 to 2040 hours. Total man-hours: 40. **Census**: Great Crested Flycatcher, 4 (25, 10); Red-headed Woodpecker, 3 (19, 8); Bewick's Wren, 3; Black-and-white Warbler, 3; Brown-headed Cowbird, 3; Cardinal, 3; Field Sparrow, 3; Mourning Dove, 2.5; Tufted Titmouse, 2.5; Yellow-billed Cuckoo, 2; Blue Jay, 2; White-breasted Nuthatch, 2; Brown Thrasher, 2; Blue-gray Gnatcatcher, 2; Bobwhite, 1.5; Carolina Chickadee, 1.5; Yellow-breasted Chat, 1.5; Black-billed Cuckoo, 1; Red-bellied Woodpecker, 1; Downy Woodpecker, 1; Carolina Wren, 1; Red-winged Blackbird, 1; Painted Bunting, 1; E. Bluebird, 0.5; Summer Tanager, 0.5; Hairy Woodpecker, +; E. Meadowlark, +; Lark Sparrow, +. **Total**: 28 species; 48.5 territorial males (300/km², 121/100 acres). **Remarks**: Woodpeckers and other hole dwellers were prominent because of the large number of dead trees. A small tornado touched a portion of the ridge May 10 knocking down a small tree and thicket. Parts were censused by sound because of the dense impenetrable thickets. By early June, the entire plot was a tick and snake filled near-impassable wilderness. Three horses grazed a corner of the plot. Special thanks to Mrs. Karl Hachmuth for permission to census her land. — ELLA DELAP and DOTTY M. GOARD, *P.O. Box 591, Bartlesville, Okla. 74003.*

From: AB 31(1):48;1977

of Wood Thrushes. Nests found: 1 hole each of Red-bellied and Downy Woodpeckers. — *RICHARD W. SIMMERS, JR., 62 Buckingham St., Cambridge, Mass. 02138.*

51. FLOODPLAIN FOREST: DREDGED MATERIAL DISPOSAL SITE. — Location: Louisiana; St. Martin Parish; Atchafalaya Basin; 30°23'N, 91°39'W, Maringouin Quadrangle, USGS. **Continuity:** New (1975). **Size:** 7.6 ha = 18.94 acres (2 transect lines; line A is 300 ft W of LA 975, 200 ft E of Whiskey Bay Pilot Channel (WBPC), and 2 mi. N of I-10, oriented N63°W (true); line B is 375 ft E of LA 975, 875 ft E of WBPC, and 1.1 mi. NW of I-10, oriented N29°W (true); both lines 2750 x 150 ft, paced with compass). **Description of Plot:** Vegetation was sampled in July 1974 using a random quadrat method for shrubs and herbaceous plants and the Bitterlich method for trees. Dredged material was deposited during construction of the WBPC in 1935 and 1936. A very minor disposal also took place in 1962 when the channel was subject to maintenance dredging. Re-establishment and growth of vegetation on the dredged material has been rapid. Black Willow (*Salix nigra*)-Sycamore (*Platanus occidentalis*) and Bald Cypress (*Taxodium distichum*)-Green Ash (*Fraxinus pennsylvanica*) associations have developed on the lower elevations and a Black Willow-Cottonwood (*Populus deltoides*) association on the higher elevations. The Black Willow-Sycamore association covers 80% (15.2 acres) of the plot. Rough-leaf Dogwood (*Cornus drummondii*) is the dominant understory species. Other important understory components are Wax Myrtle (*Myrica cerifera*) and saplings of Sweet Gum (*Liquidambar styraciflua*), Green Ash, and Sycamore. Blackberry (*Rubus argutus*) is the dominant shrub. Vines, particularly Rattan (*Berchemia scandens*), Poison Ivy (*Rhus radicans*), and Pepper Vine (*Ampelopsis arborea*), are abundant and present in the understory, shrub, and herbaceous layers. Prominent herbs are *Eupatorium album*, *Thelypteris normalis*, and *Microstegium vimineum*. Standing water is present during the winter and spring owing to flooding by the WBPC or poor internal and surface soil drainage. The tree canopy has a total of 238 stems/acre and a total basal area of 52.5 ft^2/acre. Species composing 93% of the tree canopy (figures after each give relative density (%) and relative basal area (%), in that sequence): Black Willow, 12.5, 23.5; Sycamore, 16.8, 16.6; Box-elder (*Acer negundo*), 12.3, 9.9; Red Elm (*Ulmus rubra*), 11.9, 8.8; Sweet Gum, 11, 6; Red Maple (*A. rubrum*), 10.2, 6; Cottonwood, 3.8, 11.8; Rough-leaf Dogwood, 7.7, 3.0; Green Ash, 6.8, 3. Percentage of trees sampled by diameter class: A (3-6 in.), 25; B (6-9 in.), 19; C (9-15 in.), 36; D (15-21 in.), 12; E (21-27 in.), 0; F (27-31 in.), 2. Shrub stems/acre: 5589; ground cover 10%; canopy cover 75%; average canopy height 65 ft. The Black Willow-Cottonwood association comprises 14% (2.6 acres) of the plot. Common understory components are Rough-leaf Dogwood, Wax Myrtle, and saplings of Cottonwood, Box-elder, and Black Willow. Important shrubs, vines, and herb species are the same as those found in the Black Willow-Sycamore association. The tree canopy has a total of 251 stems/acre and a total basal area of 48 ft.^{2}/acre. Species comprising 94% of the tree canopy: Black Willow, 50.7, 47.2; Cottonwood, 27.5, 33.9; Box-elder, 8.2, 6.7; Rough-leaf Dogwood, 7.7, 3.4. Percentage of trees sampled by diameter class: A, 32; B, 40; C, 23; D, 5. Shrub stems/acre: 3149; ground cover 26%, canopy cover 85%; average canopy height 50 ft. The Bald-Cypress-Green Ash association comprises 3% (0.6 acre) of the plot and is present in a depression on line A. Canopy cover is less than 20%, canopy height averages 30 ft., and dbh's are less than 6 in. The understory is mainly Black Willow. Standing water is present throughout the year except during droughts. Two 10 ft-wide surveyor cut lines and one 15 ft-wide access road to the WBPC cross line A and one 10 ft-wide surveyor cut line crosses line B; all create edge effects. A 0.2 acre clearing is present on line A and a 0.3 acre clearing is present on line B; both also create edge situations. **Edge:** Both transect lines are bordered by similar floodplain habitats. **Topography:** Gently rolling from N to S. Standing water was present in the Bald Cypress-Green Ash association and in poorly-drained sectors of the Black Willow-Sycamore association. **Elevation:** Varying from 15 to 45 ft. **Weather:** See Census 86. **Coverage:** May 7-14; between 0600 and 1000. Total man-hours: 40. **Census** 1975: White-eyed Vireo, 21 (274, 111); Cardinal, 14 (183, 74); Prothonotary Warbler, 10.5 (137, 55); N. Parula, 8 (104, 42); Red-eyed Vireo, 7.5 (98, 40); Hooded Warbler, 7 (91, 37); Yellow-breasted Chat, 5.5 (72, 29); Wood Thrush, 4 (52, 21); Yellow-billed Cuckoo, 3 (39, 16); Carolina Wren, 3; Brown-headed Cowbird (females), 3; Rufous-sided Towhee, 3; Acadian Flycatcher, 2; Green Heron, 1; Mississippi Kite, 1; Com. Yellowthroat, 1; Indigo Bunting, 1; Red-bellied Woodpecker, 0.5; Swainson's Warbler, 0.5; Hairy Woodpecker, +. **Total:** 20 species; 96.5 territorial males or females (1259/km^2, 510/100 acres). **Remarks:** Nests found (13): Prothonotary Warbler, 3; Cardinal, 3; Yellow-billed Cuckoo, 2; Mississippi Kite, 1; Green Heron, 1; Wood Thrush, 1; Red-eyed Vireo, 1; Hooded Warbler, 1. One of the Prothonotary Warbler nests was parasitized by a Brown-headed Cowbird. Carolina Chickadees and Tufted Titmice were ranging widely, suggesting that they had hatched their young and were feeding as families. This census was performed in an effort to gather baseline data for description of plant and animal succession patterns on U.S. Army, Corps of Engineers (COE) dredged material disposal sites. The study was supported by the COE, Waterways Experiment Station, Vicksburg, MS under grant number DACW 39-74-C-0092. — *STEPHEN B. ATKINS, RONALD G. PSCION, DAVID M. DuMOND,* and *STEVEN W. LEONARD, Coastal Zone Resources Corp., Wilmington, N.C. 28401.*

52. VIRGIN SCRUB OAK FOOTHILLS. — Location: Oklahoma; Osage Co., from intersection U.S. 60 and Okla. 123, 5 mi. W and 2.5 mi. SW; 96°06'N, 36°44'W, Woolaroc Quadrangle, 7.5 min. series USGS, SW one-fourth of SE quarter of section 10-26-11. **Continuity:** Established 1975. **Size:** 16.19 ha = 40 acres (square, original survey three sides, fourth side compassed). **Description of Plot:** See *AB* 29:1098 (1975). **Weather:** Dry mild spring, early season. **Coverage:** April 7, 14, 22, 29; May 5, 13, 19, 24, 28; June 11; between dawn and 1030, CDT. Total man-hours: 26. **Census:** Field Sparrow, 7 (43, 18); Great Crested Flycatcher, 4 (25, 10); Brown-headed Cowbird, 4; Tufted Titmouse, 3 (19, 8); Bewick's Wren, 3; Blue-gray Gnatcatcher, 3;

From: AB 28(6):1011;1974

number of trees (figures after each give number of trees/acre, relative density (%), relative dominance, and frequency in that sequence): Mossy-cup Oak, 54, 21, 34, 100; Green Ash, 42, 16, 13, 100; Chestnut Oak, 34, 13, 14, 80; Red Oak, 32, 12, 21, 40; Dead trees, 26, 10, 6, 100; Am. Elm, 24, 9, 4, 60; Shagbark Hickory (*Carya ovata*), 12, 9, 5, 60. Trees by diameter class (figures after each class give number of trees/acre, relative density (%), basal area in square ft/acre, and relative dominance): A (3-6 in.) 160, 61.5, 8, 15; B (6-9 in.) 26, 10, 3.9, 7; C (9-15 in.) 50, 19.2, 20, 37; D (15-21 in.) 22, 8.5, 19.8, 36; E (21-27 in.) 2, 0.8, 3.1, 6. Shrub stems/acre 4900; ground cover 72%; canopy cover 88%; average canopy height 49 ft. (range 42-58). **Edge**: Bordered on all sides by similar forest except for the middle of the south edge which is open oak woodland. **Topography**: A wooded ravine with steep slopes converging upon an intermittent stream bed running E-W through the center of the area. Elevation at the north and south boundaries is about 1040 ft and at the stream bed varies from 960 ft at the east boundary to 940 ft at the west boundary. **Weather**: Precipitation patterns were normal for May and June but drought prevailed throughout July. **Coverage**: May 16, 18, 21, 25, 28; June 16, 18, 22; July 6. All trips between 0630 and 1000 hours, CDT. Total man-hours: 22. **Census**: Blue Jay, 5, (53, 22); Cardinal, 5; E. Wood Pewee, 4 (43, 17); Black-capped Chickadee, 4; Wood Thrush, 4; Mourning Dove, 3 (32, 13); Yellow-billed Cuckoo, 3; Great Crested Flycatcher, 3; Tufted Titmouse, 3; Brown-headed Cowbird, 3; Downy Woodpecker, 2; White-breasted Nuthatch, 2; Am. Robin, 2; Kentucky Warbler, 2; Rose-breasted Grosbeak, 2; Rufous-sided Towhee, 2; Red-bellied Woodpecker, 1; Hairy Woodpecker, 1; Red-eyed Vireo, 1; N. Parula, 1; Scarlet Tanager, 1; Red-tailed Hawk, +; Red-headed Woodpecker, +; Blue-gray Gnatcatcher, +; N. Oriole, +. **Total**: 24 species; 51 territorial males (543/km^2, 220 per 100 acres). **Remarks**: The following nests were found: Cardinal 3, Wood Thrush 2, Mourning Dove 1, Downy Woodpecker 1, E. Wood Pewee 1, Am. Robin 1, Rose-breasted Grosbeak 1, and Rufous-sided Towhee 1. — CALVIN L. CINK, *Museum of Natural History, University of Kansas, Lawrence, Kansas 66045.*

48. SOUTHERN FLOODPLAIN FOREST. — Location: Texas, Nacogdoches Co., 10 miles SW of City of Nacogdoches, in Stephen F. Austin Experimental Forest; 94°47′N, 31°29′W; U.S. Geological Survey; Clawson Quadrangle, Texas; approximately 150 m north of the Angelina River and 50 m west of the Sun Pipeline. **Continuity**: New. **Size**: 25 ha = 6.18 acres (square, 500 by 500 m with 50 m grid). **Description of Plot**: The dominant canopy trees are Overcup Oak (*Quercus lyrata*) and Willow Oak (*Q. phellos*). Also present in the canopy are Bitternut Hickory (*Carya cordiformis*), Sweet-gum (*Liquidambar styraciflua*), and Black-gum (*Nyssa sylvatica*). In the understory are found Green Ash (*Fraxinus pennsylvanica*), Am. Elm (*Ulmus americana*), hawthorn (*Crataegus* spp.), and seedlings of Sweet-gum, Black-gum, Willow Oak, Bitternut Hickory, Am. Elm, and Green Ash. The dominant understory plant is Deciduous Holly (*Ilex decidua*) and dominant along the small creek which crosses the plot is Am. Hornbeam (*Carpinus caroliniana*). The dominant vines are Trumpet-honeysuckle (*Campsis radicans*) and Crossvine (*Bignonia capreolata*). The dominant ground vegetation is Pepper-vine (*Ampelopsis arborea*). A vegetational survey using 5 tenth-acre circles gave the following results: Trees 3 inches diameter and over: 304/acre; total basal area: 181.6 ft^2/acre. Species comprising 99% of the total number of trees (figures are trees/acre, relative density (%), relative dominance, and frequency, in that order): Overcup Oak, 104, 34, 15, 100; Sweet-gum, 42, 14, 60; Bitternut Hickory, 38, 12, 9, 100; Am. Elm, 24, 8, 3, 80; Black-gum, 14, 5, 7, 60; Green Ash, 8, 2, 2, 60; Am. Hornbeam, 2, .3, 20; Water Oak (*Q. nigra*), 2, 1, .3, 20. Trees by diameter size class (figures after each class give trees/acre, relative density, basal area in square feet/acre, relative dominance): A (3-6 in.), 142, 47, 14.2, 8; B (6-9 in.), 88, 29, 26.4, 14; C (9-15 in.), 39, 12, 28.8, 16; D (15-21 in.), 16, 5, 28.8, 16; E (21-27 in.), 16, 5, 49.6, 27; F (27-33 in.), 4, 1, 19.6, 11; G (32-40 in.), 2, 1, 14.2, 8. Shrub stems/acre: 12,400; ground cover 26%; canopy cover 83%; canopy height, avg. 77 ft, range 61-94 ft. **Edge:** Bordered on three sides by similar forest with the east side situated 50 m into the forest from the pipeline to reduce edge effect. **Topography**: In the Angelina River floodplain; flat throughout. One small creek and several drainages cross the plot. **Elevation:** 180 ft. **Coverage:** June 15-16, 22-23, 26, 29; July 4, 8. All censuses were made between 0630 and 1100. Total man-hours: 32. **Census:** Acadian Flycatcher, 56 (224, 91); Red-eyed Vireo, 23 (92, 37); Cardinal, 20 (80, 32); Tufted Titmouse, 16 (64, 26); Carolina Wren, 16; Prothonotary Warbler, 16; Yellow-billed Cuckoo, 15 (60, 24); Blue-gray Gnatcatcher, 12 (48, 19); Downy Woodpecker, 8 (32, 13); Great Crested Flycatcher, 7 (28, 11); Ruby-throated Hummingbird (females), 4, (16, 6); Red-bellied Woodpecker, 4; Carolina Chickadee, 3 (12, 5); Yellow-throated Vireo, 3; Yellow-throated Warbler, 3; Summer Tanager, 3; White-breasted Nuthatch, 2; Brown-headed Cowbird (females), 2; Pileated Woodpecker, 1; E. Wood Pewee, 1; White-eyed Vireo, 1; Black-and-white Warbler, 1; Am. Redstart, 1; Barred Owl, +. **Total:** 24 species; 215 territorial males or females (860/km^2, 348 per 100 acres). **Remarks:** Nests located: Yellow-billed Cuckoo, 1; Acadian Flycatcher, 1. The plot is located in a remote part of the experimental forest, relatively undisturbed by man. Mammals such as the Raccoon and Gray Squirrel are abundant. — STEPHEN B. HIGHTOWER (compiler), C.D. FISHER, MICHAEL L. BUTTS, *Stephen F. Austin State University, Nacogdoches, Texas, 75961.*

49. BALSAM FIR–BIRCH FOREST. — Location: Minnesota; St. Louis Co., Duluth, 1 mile N of Island Lake Reservoir Bridge on County 4; NE¼ - NE¼ Sect. 32, T53N, R14W-4th P.M. Boulder Lake Reservoir Quadrangle, USGS. **Continuity**: Established 1972; 3 consecutive years. **Size**: A re-measurement of the plot indicates it is actually 12.25 ha = 30.27 acres (square 49-50x50m. plots, using calibrated wire and compass). **Description of Plot**: See *AB* 26:956, 1972. **Weather**: Generally clear to partly cloudy with two censuses conducted on overcast days and no precipitation. Wind speed varied from force 0 to 3 with only two days greater than 2. Temperature for the period varied from

From: AB 33(1):67-68;1979

D (15-21 in.) 10, 3, 15.8, 12; E (21-27 in.) 4, 1, 10.8, 8. Shrub stems/acre, 3,720; ground cover 78%; canopy cover 93%; average canopy height 52 ft (range 36-78). **Edge:** Bordered on all sides by similar forest except for a small pond on the NE corner and a small clearing on the S side. **Topography:** A N facing slope; elevation about 1000-1100 ft. A creek flows through the NW corner. **Coverage:** May 30; June 2-3, 6, 9, 13; 0730-1100 and 1630-1800. Total man-hours: 12. **Census:** Yellow-billed Cuckoo, 4 (49, 20); Great Crested Flycatcher, 4; Wood Thrush, 4; Cardinal, 4; Blue Jay, 3 (37, 15); Scarlet Tanager, 2.5; Mourning Dove, 2; E. Wood Pewee, 2; Tufted Titmouse, 2; Brown Thrasher, 2; Red-eyed Vireo, 2; Louisiana Waterthrush, 2; Kentucky Warbler, 2; Chuck-will's-widow, 1; Com. Flicker, 1; Red-bellied Woodpecker, 1; Red-headed Woodpecker, 1; Downy Woodpecker, 1; Willow Flycatcher, 1; Black-capped Chickadee, 1; White-breasted Nuthatch, 1; Carolina Wren, 1; Am. Robin, 1; Rose-breasted Grosbeak, 1; Green Heron, +; Gray Catbird, +; Blue-gray Gnatcatcher, +; N. Parula, +; Summer Tanager, +. **Total:** 29 species; 46.5 territorial males (575/km^2, 233/100 acres). **Visitors:** Red-tailed Hawk, Am. Woodcock, Ruby-throated Hummingbird, Com. Crow. **Remarks:** Single nests of the following were found: Yellow-billed Cuckoo, Chuck-will's-widow, Wood Thrush, Scarlet Tanager.

41. OAK - HICKORY FOREST, IV. — Location: Kansas; Douglas Co., Sturdy's Woods. Predominantly on the NE 1/4, NE 1/4, Section 27, T-14S, R-20E, Baldwin City Quadrangle, USGS. **Continuity:** New. **Size:** 8.1 ha = 20 acres (4 × 5 acres, surveyed). **Description of Plot:** Dominant canopy trees are Post Oak, Red and Black Oak, and Shagbark Hickory. Most prominent in the understory are young Shagbark Hickory, Slippery Elm, Redbud, and Ironwood. Herbaceous ground cover is primarily Tick-Trefoil, and various grasses and composites. A quantitative survey of the vegetation gave the following results: Trees, 3 in. diameter and over, based on five 0.1-acre circular samples, 534/acre; total basal area 112.3 ft^2/acre. Live tree species counted: Post Oak, 164, 31, 26, 80; Red and Black Oak, 114, 21, 35, 100; Shagbark Hickory, 112, 21, 14, 80; Chinquapin Oak, 52, 10, 12, 40; White and Green Ash, 50, 9, 7, 100; Red Mulberry, 16, 3, 2, 20; Bitternut Hickory, 10, 2, 2, 20; Ohio Buckeye (*Aesculus glabra*), 8, 2, 1, 20; Slippery Elm, 6, 1, 1, 60; Mossy-cup Oak (*Q. macrocarpa*), 2, 0.5, 1, 20. Trees by diameter size class: A (3-6 in.) 312, 58, 37.8, 34; B (6-9 in.) 186, 35, 54, 48; C (9-15 in.) 36, 7, 20.4, 18. Shrub stems/acre, 1,600; ground cover 73%; canopy cover 81%; average canopy height 39 ft (range 29-47). **Edge:** Bordered on all sides by similar forest. **Topography:** A N facing slope; elevation about 900-1130 ft. **Coverage:** June 13, 16-18, 20; 0700-1030 and 1630 to 1830. Total man-hours: 12. **Census:** Tufted Titmouse, 4 (49, 20); Blue Jay, 3 (37, 15); Black-capped Chickadee, 3; Great Crested Flycatcher, 2; E. Wood Pewee, 2; White-breasted Nuthatch, 2; Red-eyed Vireo, 2; Yellow-billed Cuckoo, 1.5; Mourning Dove, 1; Great Horned Owl, 1; Red-bellied Woodpecker, 1; Downy Woodpecker, 1; Wood Thrush, 1; Summer Tanager, 1; Cardinal, 1; Rose-breasted Grosbeak, 1; Red-headed Woodpecker, +; Kentucky Warbler, +; Brown-headed Cowbird, +. **Total:** 19 species; 27.5 territorial males (340/km^2, 138/100 acres). **Visitors:** Com. Flicker, Hairy Woodpecker, Com. Crow, Com. Grackle.

42. OAK - HICKORY FOREST, V. — Location: Kansas; Douglas Co., East Beisecker Woods. Predominantly on the NE 1/4, NE 1/4, Section 35, T-14S, R-20E, Baldwin City Quadrangle, USGS. **Continuity:** New. **Size:** 8.1 ha = 20 acres (4 × 5 acres, surveyed). **Description of Plot:** Dominant canopy trees are Shagbark Hickory, White and Green Ash, and Post Oak. Most prominent in the understory are young Slippery Elm, Rough-leaved Dogwood, and Red and Black Oak. Herbaceous ground cover is primarily Virginia Creeper, Tick-Trefoil, and various grasses. A quantitative survey of the vegetation gave the following results: Trees, 3 in. diameter and over, based on five 0.1-acre circular samples, 268/acre; total basal area 98.3 ft^2/acre. Live tree species counted: Shagbark Hickory, 96, 36, 27, 80; White and Green Ash, 36, 13, 25, 60; Post Oak, 24, 9, 7, 20; Black Walnut, 22, 8, 15, 40; Red and Black Oak, 20, 8, 10, 80; White Oak, 12, 5, 5, 20; Slippery Elm, 12, 5, 2, 60; Redbud, 10, 4, 1, 20; Mossy-cup Oak, 8, 3, 4, 60; Chinquapin Oak, 6, 2, 2, 40; Bitternut Hickory, 6, 2, 1, 20; Red Mulberry, 6, 2, 0, 4, 40; E. Red Cedar (*Juniperus virginiana*), 6, 2, 0.3, 20; Hackberry, 2, 1, 0.2, 20; Wild Cherry, 2, 1, 1, 20. Trees by diameter size class: A (3-6 in.) 98, 37, 10.7, 11; B (6-9 in.) 90, 34, 27.1, 28; C (9-15 in.) 70, 26, 43.5, 44; D (15-21 in.) 10, 4, 17.1, 17. Shrub stems/acre, 1,380; ground cover 80% canopy cover 86%; average canopy height 47 ft (range 39-58). **Edge:** Bordered on all sides by similar forest. **Topography:** An E facing slope; elevation about 950-1040 ft. **Coverage:** June 24, 27, 30; July 1-2; from 0600-1100 and 1600-1930. Total man-hours: 11. **Census:** Blue Jay, 4 (49, 20) Downy Woodpecker, 3 (37, 15); Tufted Titmouse, 3; White-breasted Nuthatch, 3; Kentucky Warbler, 3; E. Wood Pewee, 2; Black-capped Chickadee, 2; Wood Thrush, 2; Red-eyed Vireo, 2; Mourning Dove, 1; Yellow-billed Cuckoo, 1; Whip-poor-will, 1; Com. Flicker, 1; Red-bellied Woodpecker, 1; Red-headed Woodpecker, 1; Great Crested Flycatcher, 1; Am. Robin, 1; Scarlet Tanager, 1; Summer Tanager, 1; Cardinal, 1; Barred Owl, +; Chuck-will's-widow, +; Hairy Woodpecker, +; Blue-gray Gnatcatcher, +; Brown-headed Cowbird, +. **Total:** 25 species; 35 territorial males (432/km^2, 175/100 acres). **Visitors:** Turkey Vulture, Red-tailed Hawk, Rough-winged Swallow, Carolina Wren, Gray Catbird, Warbling Vireo, N. Oriole, Indigo Bunting, Am. Goldfinch.

43. OAK - HICKORY FOREST, VI. — Location: Kansas; Douglas Co., West Beisecker Woods. Predominantly on the SW 1/4, NE 1/4, Section 35, T-14S, R-20E, Baldwin City Quadrangle, USGS. **Continuity:** New. **Size:** 8.1 ha = 20 acres (4 × 5 acres, surveyed). **Description of Plot:** Dominant canopy trees are Post Oak, Shagbark Hickory, and Black Jack Oak (*Q. marilandica*). Most prominent in the understory are White and Green Ash saplings, Slippery Elm saplings (*Ulmus fulva*), and Rough-leaved Dogwood. Herbaceous ground cover is partially various grasses, Elm-leaf Goldenrod, and Virginia Creeper. A quantitative survey of the vegetation gave the following results: Trees, 3 in. diameter and over, based on five 0.1-acre circular samples, 376/acre; total basal area 107.3 ft^2/acre. Tree species counted: Post Oak, 186, 50, 48, 80; Shagbark Hickory, 92, 25, 22, 100; Black Jack Oak, 34, 9, 10, 80; Mossy-cup Oak, 18, 5, 8, 40; White and Green Ash, 12, 3, 3, 40; Chinquapin Oak, 8, 2, 2, 20; Red and Black Oak, 8, 2, 3, 80; Slippery Elm, 6, 2, 1, 20; Black Walnut, 4, 1, 1, 20; Wild Cherry, 2, 0.5, 0.3, 20; Ohio Buckeye, 2, 0.5, 0.1, 20; Red Mulberry, 2, 0.5, 0.3, 20. Trees by diameter size class: A (3-6 in.) 118, 32, 14.5, 14; B (6-9 in.) 198, 53, 58.7, 55; C (9-15 in.) 60, 16, 34.1, 32. Shrub stems/acre, 1920; ground cover 66%; canopy cover 86%; average canopy height 42 ft (range 35-50). **Edge:** Bordered by similar forest on all sides. **Topography:** A W facing slope; elevation about 1000-1050 ft. **Coverage:** June 17, 23-25, 30; July 1; 0630-1030 and 1530-1900. Total man-hours: 10. **Census:** Great Crested Flycatcher, 3 (37, 15); Blue Jay, 3; Tufted Titmouse, 3; Mourning Dove, 2; Black-capped Chickadee, 2; Wood Thrush, 2; Red-eyed Vireo, 2; Yellow-billed Cuckoo, 1; Great Horned Owl, 1; Whip-poor-will, 1; Downy Woodpecker, 1; E. Wood Pewee, 1; Brown-headed Cowbird, 1; Summer Tanager, 1; Red-bellied Woodpecker, +; White-breasted Nuthatch, +; Kentucky Warbler, +; Cardinal, +. **Total:** 18 species; 24 territorial males (297/km^2, 120/100 acres). **Visitors:** Red-tailed Hawk, Com. Flicker, Com. Crow, Brown Thrasher, Am. Robin, Warbling Vireo, N. Oriole, Com. Grackle, Am. Goldfinch.

44. BOTTOMLAND HARDWOOD FOREST. — Location: Texas; Ft. Bend Co., Hale Ranch State Park, 4 mi ESE of intersection of Fm. 762 and Sawmill Road; NW corner 29° 23′10″N, 95°35′W, Thompsons Quadrangle, USGS. **Continuity:** New. **Size:** 6.48 ha = 16 acres (square, surveyed with steel tape and compass). **Description of Plot:** The dominant canopy trees are Cedar Elm (*Ulmus crassifolia*), Green Ash (*Fraxinus pennsylvanica*), and Sugar Hackberry (*Celtis laevigata*). Prominent in the understory are hawthorn (*Crataegus* sp.), Deciduous Holly (*Ilex decidua*) and W. Soapberry (*Sapindus drummondii*), and an extensive liana growth, the prominent species being Poison Ivy (*Toxicodendron radicans*), Com. Trumpet-Creeper (*Bignonia radicans*) and Virginia Creeper (*Parthenocissus quinquefolia*). Spanish Moss (*Tillandsia usneoides*) is prominent. The ground cover is primarily Virginia Wildrye (*Elymus virginicus*), sedge (*Carex* sp.), Mist Flower (*Eupatorium coelestinum*) and Coralberry (*Symphoricarpos orbiculatus*). A quantitative survey of the vegetation gave the following results: Trees 3 in. diameter and over, based on six circular samples: 252.8/acre; total basal area 158.6 ft^2/acre. Species comprising 92.8% of the total number of trees (figures give number of trees/acre, relative density in percent, relative dominance and frequency, in that sequence): Green Ash, 68.8, 27.2, 24.1, 83.3; Cedar Elm, 54.4, 21.5, 34.7, 100; Sugar Hackberry, 41.6, 16.4, 28.6, 38.3; Pecan (*Carya illinoensis*), 36.8, 14.5, 4.3, 83.3; Hawthorn, 19.2, 7.5, 4.6, 83.3; Woollybucket Bumelia (*Bumelia lanuginosa*), 16, 6.3, 2.5, 66.6. Trees by diameter size class (figures give number of trees/acre, relative density in percent, basal area in ft^2/acre, relative dominance): A (3-6 in.) 81.6, 32.3, 11.4, 7.2; B (6-9 in.) 43.2, 17, 13, 8.2; C (9-15 in.) 102.4, 40.5, 81.9, 51.6; D (15-21 in.) 20.8, 8.3, 37.4, 23.6; E (21-27 in.) 4.8, 1.9, 14.9, 9.4. Shrub stems/acre 3,700; ground cover 93%; canopy cover 79%; average canopy height 60 ft (range 56-66). **Edge:** Bordered on the N by 500 ft of similar forest, followed by Cottonwood Bayou, Sawmill Road and extensive pasturage, on the E by similar forest, on the S and W by a grass-covered road (approximately 25 ft in width), followed by similar forest. A small creek, dry during the count period, crosses the NW corner. **Topography:** Essentially flat. **Elevation:** 49 ft. **Weather:** Extremely hot and dry throughout period, near-drought conditions prevailing through third week of May; 65-85°. **Coverage:** Apr. 8, 29; May 13, 27, 29; June 4, 10, 24; 0630-0930 hours. Total man-hours: 15. **Census:** Cardinal, 8 (124, 50); White-eyed Vireo, 7 (107, 44); Tufted Titmouse, 4 (62, 25); Carolina Wren, 4; N. Parula, 4; Yellow-billed Cuckoo, 3 (46, 19); Acadian Flycatcher, 3; Carolina Chickadee, 3; Summer Tanager, 2; Painted Bunting, 2; Red-bellied Woodpecker, 1; Red-eyed Vireo, 1; Prothonotary Warbler, 1; Brown-headed Cowbird, 1 (female); Great Crested Flycatcher, 0.5; Red-shouldered Hawk, +; Downy Woodpecker, +; Com. Crow, +; Yellow-throated Vireo, +; Swainson's Warbler, +. **Total:** 20 species; 44.5 territorial males or females (687/km^2, 278/100 acres). **Remarks:** Part of the Hale Ranch State Park site, presently being developed by Texas Parks and Wildlife. Special thanks to Wesley Cureton and David Dauphin for assistance with measurements, and to Larry Lodwick and Debbie Dekeyzer for help with the quantitative habitat description. — *TED L. EUBANKS JR. (compiler), JAMES G. MORGAN, 4012 Childress, Houston, Tex. 77005.*

45. MAPLE - PINE - OAK SECOND-GROWTH FOREST. — **Location:** Massachusetts; Norfolk Co., Town of Foxboro conservation land, off Willow and East Streets; 42°04′N, 71°11′30″W, Mansfield Quadrangle, USGS. **Continuity:** Established 1976; 3 consecutive years. **Size:** 11.8 ha = 29.2 acres. **Description of Plot:** See *AB* 31:50-51 (1977). **Weather:** In nearby Boston the temperature for May was 0.7°F above normal, for June 0.3°F above; rainfall in May was 1.03 in. above normal, in June 1.66 in. below. **Coverage:** Apr. 29; May 2-3, 8, 10, 13, 19, 21-22, 28; June 1, 3, 6, 9-10, 12; July 1, 5-6; 0515-1120. Total man-hours: 37. **Census:** Blue Jay, 5 (42, 17); Black-capped Chickadee, 4 (34, 14); Ovenbird, 4; Scarlet Tanager, 4; Rufous-sided Towhee, 4; Gray Catbird, 3 (25, 10); Black-and-white Warbler, 3; Tufted Titmouse, 2.5; Veery, 2; Com. Flicker, 1.5; Downy Woodpecker, 1.5; Com. Yellowthroat, 1.5; Yellow-billed Cuckoo, 1; White-breasted Nuthatch, 1; Am. Robin, 1; Wood Thrush, 1; Blue-winged Warbler, 1; N. Oriole, 1; Com. Grackle, 1; Cardinal, 1; Red-eyed Vireo, 0.5; Broad-winged Hawk, +; Ruffed Grouse, +; Hairy Woodpecker, + Great Crested Flycatcher, +; Com. Crow, +. **Total:** 26 species; 44.5 territorial males or females (377/km^2, 152/100 acres). **Remarks:** The census area was sprayed by helicopter with the mosquito larvicide Abate in early May. Gypsy moths, which had defoliated most oaks in the previous two summers, were significantly reduced in numbers this year. The number of birds nesting was lower than in the previous two years. Field Sparrows and Nashville Warblers, which nested in previous years, were observed through May 21, but not thereafter. Crows were encountered much more frequently this year and may have nested near the census area. — *WILLIAM E. DAVIS, JR., College of Basic Studies, Boston Univ., Boston, Mass. 02215.*

46. CLIMAX HEMLOCK - WHITE PINE FOREST, WITH TRANSITION HARDWOODS. — **Location:** Connecticut; Litchfield Co., White Memorial Foundation, Litchfield; 41°43′20″N, 73°12′W, Litchfield Quadrangle, USGS. **Continuity:** Established 1965; 12 intermittent years. **Size:** 10.52 ha = 26 acres. **Description of Plot:** See *AFN* 19: 594-595 (1965). **Coverage:** Apr. 29-30; May 22; June 5-7, 14. Total man-hours: 21. **Census:** Blackburnian Warbler, 16 (152, 62); Ovenbird, 10 (95, 38); Veery, 8 (76, 31); Black-throated Green Warbler, 7 (67, 27); Red-eyed Vireo, 6 (57, 23); Scarlet Tanager, 5.5 (52, 21); Black-and-white Warbler, 5 (48, 19); Blue Jay, 4 (38, 15); Black-capped Chickadee, 4; Red-breasted Nuthatch, 4; Brown Creeper, 3 (29, 12); Wood Thrush, 3; Ruby-throated Hummingbird, 2; Great Crested Flycatcher, 2; Com. Crow, 2; Solitary Vireo, 2; Yellow-rumped Warbler, 2; Com. Yellowthroat, 2; Brown-headed Cowbird, 2; Rufous-sided Towhee, 2; Barred Owl, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; White-breasted Nuthatch, 1; Cardinal, 1; Purple Finch, 1; Broad-winged Hawk, 0.5; N. Oriole, 0.5; Song Sparrow, 0.5; Goshawk, +; Com. Flicker, +; Gray Catbird, +; Am. Robin, +; Hermit Thrush, +; Am. Redstart, +; Rose-breasted Grosbeak, +; White-throated Sparrow, +. **Total:** 38 species; 100 territorial males (950/km^2, 385/100 acres). **Remarks:** Density increase of slightly over 10% from 1977 creates a new, all-time high. Increased efficiency in sorting out song-territories in the dense woods and high canopies is partly responsible, as, presumably, is the effect of "glades" and sunlight penetration resulting from windfalls (since 1976) and the removal (in 1975) of a few large trees. A new species, Ruby-throated Hummingbird, inhabited these glades. Blackburnian Warbler, at 16, is at a new, all-time species high. Thanks to Jim Cavanaugh. — *ANDREW MAGEE, 34 Hobson Street, Springfield, Mass. 01109.*

47. CLIMAX BEECH - HEMLOCK FOREST. — **Location:** New York; St. Lawrence Co., Shoreline of Cranberry Lake, ¼ mi E of Arnold's Point; 44°15′N, 74°45′W; Cranberry Lake Quadrangle, USGS. **Continuity:** New. **Size:** 8.7 ha = 21.5 acres (compass and range finder). **Description of Plot:** Representative of the climax mixed forest community of this area. As far as known (about 185 yrs.) this plot and surrounding forest has not been logged or burned. A quantitative survey of 24 0.1 acre circles gave the following results: Trees 3 in. in diameter and over, 264/acre; total basal area 207.5 ft^2/acre. The component tree species were: Am. Beech (*Fagus grandifolia*), 139, 53, 29, 100; E. Hemlock (*Tsuga canadensis*), 36, 14, 28, 96; dead trees, 28, 11, 11, 92; Sugar Maple (*Acer saccharum*), 21, 8, 14, 96; Red Spruce (*Picea rubens*), 18, 7, 5, 63; Yellow Birch (*Betula lutea*), 12, 5, 10, 54; Red Maple (*A. rubrum*), 10, 4, 3, 25. Trees by diameter size class: A (3-6 in.) 98, 37, 9.8, 5; B (6-9 in.) 62, 24, 18.6, 9; C (9-15 in.) 55, 21, 45., 22; D (15-21 in.) 56, 23, 42., 20; E (21-27 in.) 18, 7, 55.5, 27; F (27-33 in.) 6, 2, 30.6, 15; G (33-40 in.) 1, 1, 5.9, 3. Shrub stems per acre, 271; ground cover, 54%; canopy cover, 87%; mean canopy heights, 65 ft (range 49-81). **Edge:** Surrounded by similar forest on two sides and lake shore (within 50 m) on two. **Topography:** Slight N slope (1490-1520 ft elevation) toward lake shore. **Coverage:** June 22, 26, 28; July 4-5, 10; 0500-0830. Total man-hours: 20. **Census:** Red-eyed Vireo, 8 (92, 37); Blackburnian Warbler, 8; Swainson's Thrush, 5 (57, 23); Black-throated Green Warbler, 4.5 (52, 21); Red-breasted Nuthatch, 2; Solitary Vireo, 2; Golden-crowned Kinglet, 1; N. Parula, 1; Black-throated Blue Warbler, 1; Yellow-rumped Warbler, 1; Scarlet Tanager, 1; Barred Owl, +; Hairy Woodpecker, +; Great Crested Flycatcher, +; Black-capped Chickadee, +; Brown Creeper, +; Winter Wren, +; Am. Robin, +; Canada Warbler, +; Am. Redstart, +; White-throated Sparrow, +. **Total:** 21 species; 345 territories (397/km^2, 160/100 acres). **Remarks:** Conducted as an ornithology class project at the Cranberry Lake Biological Field Station. Special thanks to Doug Fraser for assistance. — *BARRY R. NOON, Biology Dept., Siena College, Loudonville, N.Y. 12211.*

48. PITCH PINE - SCRUB OAK BARRENS. — **Location:** New York; Suffolk Co., Westhampton, 0.6 mi S of state road 27 and 0.9 mi W of county road 31; 40°51′23″N, 72°39′46″W, Eastport Quadrangle, USGS. **Continuity:** New. **Size:** 9.67 ha = 23.9 acres (rectangular 244 × 396 m, grid with 30.5 m square units marked off with numbered wooden stakes, measured with transit and steel tape). **Description of Plot:** A representative section of the Dwarf Pine Plains or Pitch Pine-Scrub Oak Barrens, which cover a large area in this region, characterized by scattered dwarfed Pitch Pine (*Pinus rigida*) and scattered to dense thickets of Scrub Oak (*Quercus ilicifolia*). In contrast to other pine barrens on Long Island, which eventually revert to climax oak forest if protected from fire and cutting, larger oak species such as White and Scarlet are absent. Thus, this plant community constitutes a climax type maintained primarily by poor soil and severe local microclimate and secondarily by fire. However, the plot and the surrounding area have apparently not been burned for many years and the pine plains have reportedly existed with little change since colonial days. The Pitch Pine is the only tree species and is rather scattered except in the NW corner where a small dense stand is located. Scrub Oak is the only species in the dominant shrub layer and is 2-5 ft in height with most 3-4 ft. A lower shrub layer 1-2 ft tall is composed largely of Black Huckleberry (*Gaylussacia baccata*) and Late Blueberry (*Vaccinium vacillans*) with some Low Blueberry (*V. pensylvanicum*). True ground cover is predominatly Bearberry (*Arctostaphylos uva-ursi*), which covers nearly all areas not too shaded by trees or shrubs. A moderate amount of Heath-like *Hudsonia ericoides* and a little Wooly Hudsonia (*H. tomentosa*) are also present. Herbaceous plants are thinly scattered throughout in the more open areas.

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females (290/km^2, 117/100 acres). **Remarks:** Nests found: Whip-poor-will, Hairy Woodpecker. This census was a comparison study to Census 81. (Deciduous Clearcut). This plot is a relatively unchanging forested area maintained by the U.S. Forest Service. It closely represents the type of habitat that existed on the clearcut plot before it was cut and also the type of habitat the clearcut should succeed to eventually. Special thanks to Gary Lewis for assistance in measuring the plot and surveying the vegetation.—*RICHARD LEWIS, Rt. 3, Box 470, Bristol, TN 37620.*

48. MISSISSIPPI DELTA BOTTOMLAND HARDWOODS (MANAGED). — Location: Arkansas; Arkansas Co., White River Nat'l Ref., Timber Comp. 6; 1.2 mi SE St. Charles: 34°22'N, 91°7'W, Indian Bay SE Quadrangle, USGS. **Continuity:** New. **Size:** 10.9 ha = 26.9 acres (trapezoidal, measured with compass and "Hip Chain"). **Description of Plot:** The relatively even-aged canopy is dominated by Willow Oak *(Quercus phellos)*, Sugarberry *(Celtis laevigata)*, Green Ash *(Fraxinus pennsylvanica)*, Water Hickory *(Carya aquatica)*, Sweet Gum *(Liquidambar styraciflua)*, and E. Cottonwood *(Populus deltoides)*. Understory trees include smaller specimens of the canopy species as well as Am. Elm *(Ulmus americana)*, Possumhaw *(Ilex decidua)*, Ironwood *(Carpinus caroliniana)*, Red Mulberry *(Morus rubra)* and others. A few very large Bald Cypress *(Taxodium distichum)*, Willow Oak, Water Oak *(Q. nigra)* and Cherrybark Oak *(Q. falcata)* are widely scattered on the plot. River Birch *(Betula nigra)* and Black Willow *(Salix nigra)* occur along the river bank. Trumpet Creeper *(Campsis radicans)* is abundant. There are 2 small, relic Canebrakes *(Arundinaria gigantea)*. The ground is mostly bare of green vegetation but with small patches of Poison Ivy *(Toxicodendron radicans)* and *Galactia mohlenbrockii*. The forest was logged in the 1960s and 70s with removal of nearly all merchantable Com. Persimmon *(Diospyros virginiana)* and Pecan *(Carya illinoensis)*, and most of the Bald Cypress and Red Oaks. A quantitative survey of the vegetation gave the following results: Trees, 3 in. diameter and over, based on 10 0.1 acre circular samples, 361/acre; total basal area, 140.9 ft^2/acre. Species comprising 90.7% of the total number of trees: Sugarberry, 76, 21, 7, 80; dead trees, 57, 16, 9, 90; Am. Elm, 54, 15, 6, 70; Willow Oak, 40, 11, 29, 90; Green Ash, 36, 10, 8, 70; Sweet Gum, 27, 8, 8, 60; Water Hickory and Pecan, 14, 4, 4, 60; Overcup Oak *(Q. lyrata)*, 14, 4, 6, 50; Honey Locust *(Gleditsia triacanthos)*, 9, 3, 3, 40. Trees by diameter size class: A (3-6 in.) 224, 62, 22, 16; B (6-9 in.) 75, 21, 23, 16; C (9-15 in.) 44, 12, 35, 26; D (15-21 in.) 10, 3, 18, 13; E (21-27 in.) 4, 1, 12, 9; F (27-33 in.) 2, 0.6, 10, 7; G (33-40 in.) 1, 0.3, 7, 5; H (52 in.) 1, 0.3, 14, 10. Shrub stems per acre, 775; canopy cover 81%; ground cover 43%; average canopy height 25 ft (range 15-50). **Edge:** Bounded by the White River on 1 side and similar habitat on the other 3 sides with a 2-yr old field approaching 1 corner. **Topography:** Ridge and swale, and sloping gradually in 1 corner into an area about 1-2 ft lower in elevation, frequently containing standing water. A small semi-permanent slough stagnates during low water. **Elevation:** 150-155 ft (45-47 m). **Weather:** Normal for the period. **Coverage:** May 22-24, 28, 30-31; June 1, 3, 7, 9, 14, 18, 21, 23; Sunrise—1000 and 1700-2200. Total man-hours: 26.5. **Census:** Blue-gray Gnatcatcher, 21 (193, 78); Carolina Chickadee, 10 (92, 37); Acadian Flycatcher, 8 (73, 30); Carolina Wren, 6.5 (60, 24); Red-eyed Vireo, 6 (55, 22); Brown-headed Cowbird, 6; Cardinal, 5.5 (51, 20); Ruby-throated Hummingbird, 5 (46, 19); Downy Woodpecker, 5; Tufted Titmouse, 5; Prothonotary Warbler, 5; Yellow-billed Cuckoo, 4.5 (41, 17); N. Parula, 4 (37, 15); Blue Jay, 3 (28, 11); Indigo Bunting, 2.5; Red-bellied Woodpecker, 2; Great Crested Flycatcher, 1.5; White-eyed Vireo, 1.5; Orchard Oriole, 1.5; Broad-winged Hawk, 1; Turkey, 1; Barred Owl, 1; Com. Flicker, 1; Pileated Woodpecker, 1; Summer Tanager, 1; Wood Duck, +; Red-tailed Hawk, +; Wood Thrush, +. **Total:** 28 species; 109.5 territorial males (1006/km^2, 407/100 acres). **Visitors:** Great Horned Owl, Red-headed Woodpecker, Hairy Woodpecker, E. Wood Pewee, Yellow-throated Vireo, Kentucky Warbler, Com. Yellowthroat, Com. Grackle. **Remarks:** Nests located (1 each): Yellow-billed Cuckoo, Acadian Flycatcher.—*STEVEN P. CHRISTMAN, Denver Wildlife Research Center, 412 NE 16th Ave., Gainesville, FL 32601.*

BBC 48. White River N.W.R., Arkansas Co., Ark. Mississippi Delta Bottomlands (Managed). Photo/Steven P. Christman.

49. MISSISSIPPI DELTA BOTTOMLAND HARDWOODS (UNMANAGED). — Location: Arkansas; Arkansas Co., White River Nat'l Wildl. Ref., Striplin Woods; 0.7 mi SE St. Charles; 34°22'N, 91°7'W, Indian Bay SE Quadrangle, USGS. **Continuity:** New. **Size:** 9.7 ha = 24.0 acres (trapezoidal: measured with compass and "Hip Chain"). **Description of Plot:** The uneven-aged canopy is dominated by widely-spaced large specimens of Overcup Oak *(Quercus lyrata)*, Nuttall Oak *(Q. nuttallii)*, Swamp Chestnut Oak *(Q. michauxii)*, Willow Oak *(Q. phellos)*, Pecan *(Carya illinoiensis)*, and Sycamore *(Platanus occidentalis)*. Large Com. Persimmon *(Diospyros virginiana)*, Cedar Elm *(Ulmus crassifolia)*, E. Cottonwood *(Populus deltoides)*, Honey Locust *(Gleditsia triacanthos)*, Sweet Gum *(Liquidambar styraciflua)*, and Bald Cypress *(Taxodium distichum)* also contribute to the canopy. River Birch *(Betula nigra)* and large Black Willow *(Salix nigra)* occur along the river bank. Numerous natural tree falls and large dead trees create thickety openings dominated by Trumpet Creeper *(Campsis radicans)*, Grape *(Vitis* sp.), Pepper-vine *(Ampelopsis arborea)*, blackberry (*Rubus* sp.) and small trees of several species. The understory includes Silver Maple *(Acer saccharinum)*, Sugarberry *(Celtis laevigata)*, Red Mulberry *(Morus rubra)*, Am. Elm *(Ulmus americana)*, Possumhaw *(Ilex decidua)*, *Sassafras albidum*, and others. Trumpet Creeper, Supplejack *(Berchemia scandens)*, Pepper-vine, Greenbriar (*Smilax* sp.), Grape and Poison Ivy *(Toxicodendron radicans)* are everywhere in abundance. A relic Canebrake *(Arundinaria gigantea)* persists in 1 corner. The ground is sometimes bare of living vegetation, but often is covered with Poison Ivy sometimes standing to a height of 1 m. The forest has not been logged since the beginning of the century. A quantitative survey of the vegetation gave the following results: Trees, 3 in. diameter and over, based on 10 0.1 acre circular samples, 194/acre; total basal area, 138.5 ft^2/acre. Species comprising 90.2% of the total number of trees: Am. Elm, 39, 20, 6, 60; Sweet Gum, 31, 16, 5, 50; dead trees, 21, 11, 11, 80; Sugarberry 18, 9, 2, 60; Com. Persimmon, 15, 8, 9, 40; Overcup Oak, 14, 7, 26, 40; Pecan and Water Hickory, 10, 5, 4, 50; Cedar Elm, 9, 5, 5, 30; Silver Maple, 6, 3, 0.6, 30; Water Oak *(Q. nigra)*, 6, 3, 3, 40; Willow Oak, 6, 3, 10, 40. Trees by diameter size class: A (3-6 in.) 101, 52, 10, 7; B (6-9 in.) 33, 17, 10, 7; C (9-15 in.) 30, 16, 24, 17; D (15-21 in.) 15, 8, 27, 20; E (21-27 in.) 10, 5, 31, 22; F (27-33 in.) 2, 1, 10, 7; G (33-40 in.) 2, 1, 14, 10; H (50 in.) 1, 0.5, 13, 9. Shrub stems per acre, 2520; canopy cover 74%; ground cover 49%; average canopy height 57 ft (range 30-80). **Edge:** Bounded by the White River on 1 side, 50-100 m of similar habitat then a terrace on 1 side, 70 m of similar habitat then a dirt road and highway bridge on 1 side, and similar habitat on the remaining side, with a 2-yr old field abutting the corner. **Topography:** Ridge and swale with a small, semi-permanent slough. **Elevation:** 151-155 ft (46–47 m). **Weather:** Normal for the period. **Coverage:** May 26, 30-31; June 1-2, 4-6, 8, 11, 17-18, 21, 23; Sunrise-1000 and 1500-2200. Total man-hours: 30.5 **Census:** Blue-gray Gnatcatcher, 28 (288, 117); Carolina Chickadee, 8 (82, 33); Acadian Flycatcher, 7.5 (77, 31); N. Parula, 7 (72, 29); Ruby-throated Hummingbird, 6 (62, 25); Carolina Wren, 5 (51, 21); Brown-headed Cowbird, 5; Cardinal, 5; Tufted Titmouse, 4 (41, 17); Yellow-billed Cuckoo, 3 (31, 13); Red-bellied Woodpecker, 3; White-eyed Vireo, 3; Downy Woodpecker, 2.5; Prothonotary Warbler, 2.5; Kentucky Warbler, 2.5; Pileated Woodpecker, 2; Great Crested Flycatcher, 2; Wood Thrush, 2; Indigo Bunting, 2; Wood Duck, 1; Mississippi Kite, 1; Red-headed Woodpecker, 1; Hairy Woodpecker, 1; E. Wood Pewee, 1; Blue Jay, 1; Red-eyed Vireo, 1; Swainson's Warbler, 1; Orchard Oriole, 1; Yellow-breasted Chat, +. **Total:** 29 species; 109 territorial males (1122/km^2, 454/100 acres). **Visitors:** Yellow-crowned Night Heron, Barred Owl, Chimney Swift, Com. Flicker, White-breasted Nuthatch, Yellow-throated Vireo, Am. Redstart, Summer Tanager, Com. Grackle. **Remarks:** Nests located (1 each): Ruby-throated Hummingbird, Red-headed Woodpecker, Wood Thrush, Cardinal. Blue-gray Gnatcatchers observed feeding fledgling cowbirds on 4 occasions.—*STEVEN P. CHRISTMAN, Den-*